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**Exploring kindergarten Teachers' beliefs of
facilitators and barriers when utilising technology in
teaching children: a qualitative study in the
Kingdom of Saudi Arabia**

BY

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**A thesis submitted in fulfilment of the requirements for
the award of the degree of Doctor of Philosophy (PhD)**

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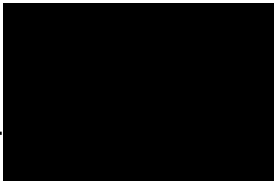
Academic Thesis: Declaration of Authorship

I, Maram Alawad, declare that this thesis and the work presented in it are my own and have been generated by me as the result of my own original research.

Exploring kindergarten Teachers' beliefs of facilitators and barriers when utilising technology in teaching children: a qualitative study in the Kingdom of Saudi Arabia

I hereby declare that this thesis represents my own work which has been done after registration for the degree of PhD at Sheffield University and has not been previously included in a thesis or dissertation submitted to this or any other institution for a degree diploma or other qualifications. I have read the University's current research ethics guidelines and accept responsibility for the conduct of the procedures in accordance with the University's Committee on the Use of Human & Animal Subjects in Teaching and Research (HASC). I have attempted to identify all the risks related to this research that may arise in conducting this research, obtained the relevant ethical and/or safety approval (where applicable), and acknowledged my obligations and the rights of the participants.

I confirm that none of this work has been published before submission.

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Dated: 22 July 2022

Abstract

The integration of technology into kindergarten classrooms has been extensively studied worldwide, albeit from different perspectives and beliefs. However, there is a dearth of studies examining the use of technology in Saudi Arabia's early childhood classrooms. Thus, this study aimed to explore and provide a comprehensive understanding of Saudi kindergarten teachers' beliefs, perceptions, and practices concerning the use of technology to enhance children's educational development. To achieve this objective, a series of semi-structured interviews were conducted with female kindergarten teachers from five districts in Riyadh, Saudi Arabia. These teachers were selected using a purposive sampling technique and had a minimum of three years of experience in using technology in their classrooms. In total, twenty interviews were conducted, and all transcripts were translated from Arabic to English using the backwards-forward translation technique. The data was analysed using thematic analysis, and NVivo software (version 12) was employed to organize and facilitate the themes. The findings reveal five main themes, eleven subthemes, and twenty-six sub-subthemes. The first theme pertains to teachers' beliefs that technology has the potential to benefit education and promote children's future development. The second theme highlights the challenges of fully integrating technology into the educational system due to technical limitations. The third theme discusses the accessibility of new technologies. Lastly, teachers emphasised the value of technology in promoting in-class preparation and effective communication with parents, which may enable the most optimal growth of children. Overall, the findings support the use of technology within the kindergarten phase and encourage policymakers to understand and address specific issues faced by teachers in the Saudi school system. The implementation of technology in classrooms will support children's learning and development and enable links between home and school, emphasising the significance of technological integration for educational advancement.

Acknowledgements and dedication

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Abbreviations

1	ECE	Early Childhood Education
2	ICF	Informed Consent Form
3	ICT	Information and communications technology
4	MER	Middle East Region
5	MoE	Ministry of Education
6	NAEYC	National Association for the Education of Young Children
7	NGOs	Non-governmental organizations
8	PIS	Participant Information Sheet
9	PSEP	Pre-School Education Programme
10	TA	Thematic Analysis
11	TAM	Technology Acceptance Model
12	TPACK	Teachers with high technology, pedagogy, and content knowledge
13	TPB	Theory of Planned Behaviour

1 Chapter One: Introduction

1.1 Overview

This chapter offers background information that provides an insight into important and relevant studies on the topic of utilising technology in kindergarten in developing nations like Saudi Arabia. In addition, this chapter discusses in detail the rationale for selecting the topic of kindergarten teachers' attitudes towards utilising technology among students in Saudi Arabia and states the existing literature gap. Finally, the chapter summarises the research questions and the study's goals and objectives and provides a summary of all six chapters.

1.2 Introduction

The Internet Corporation for Assigned Names and Numbers (ICANN), the authority responsible for regulating domain names and associated IP addresses, reported in 2017 that Internet penetration was 54.4% worldwide. This means that more than four billion of the world's 7.6 billion individuals use the Internet in some form. At a continental level, Asia's Internet penetration rates, which includes the Middle East, account for about half of the world's Internet users, with an estimated two billion users (Miniwatts Marketing Group, 2018). These figures illustrate the increasing global interconnectedness of technology (Miniwatts Marketing Group, 2018). The Middle East has experienced a surge in Internet and technology consumption (Statista, 2018). This growth might be related to the Middle East nations' low average age. Saudi Arabia, for example, has a median age of 29.8 years, according to the Statistics Portal (2018). Additionally, Poushter (2016) said that younger generations are more likely to use the Internet and cell phones than those aged 35 and above, which might lead to a higher global average of technology and Internet usage. Recently, the number of people using the internet throughout the world increased to five billion, which is equivalent to 63% of the total population of the world (Statista, 2022). As a result, education has likely been the second

most impacted sector in terms of information and communications technology (ICT) integration behind e-commerce (Ampofo et al., 2014). Conventional learning methods, which require both the teacher and the student to be physically present, have been made more flexible by technology. For instance, the use of technology theoretically enables remote learning and instruction regardless of the tutor's or learner's distance or physical location. Apart from increasing the flexibility and fluidity of contact, technology has also added a significant resource to education. Notably, multimedia tools such as instructional films, electronic texts, and institutional-based social networking sites have become critical in enabling education (Ampofo et al., 2014).

According to Simsim (2011), Saudi Arabia had the highest proportion of Internet users in the Arab world in late 2009, and additionally, Internet consumption grew at a notable rate in Saudi Arabia, where Internet service grew at about ten times the pace of worldwide online activity growth during that period. Accordingly, this has also impacted the population's internet usage as a whole, as there are more preschool children utilising the internet than ever before (Almogbel, 2019). In January 2021, Saudi Arabia had 33.58 million internet users, which is an increase of 1.3 million between 2020 and 2021. Accordingly, 95.7% of the population can access the internet as of January 2021 (Kemp, 2021). Government involvement in educational technology in Saudi Arabia's education sector date all the way back to 1985, when the General Administration of Educational Technology was founded, which has aided in integrating technology into education (Alqarni, 2015). Despite government attempts to encourage technology (for instance) use in the learning process by funding higher education technology use, the preschool sector continues to lack in terms of the use of digital tech in formal early childhood settings (Al Hezam, 2017). This is partly due to teachers' attitudes towards technology in relation to their resistance to change in the classroom, their lack of time to learn technology, and their overall lack of confidence in using technology (Alqarni, 2015). As a

result, to implement technology effectively, level barriers must be overcome. In the case of this study, it conducted its data collection before the Covid-19 pandemic. It discussed the aspect of technology in learning, which the pandemic will have had an impact on; this thesis does not aim to answer questions about digital technologies and their role in early childhood during the pandemic.

Early childhood education and care (ECEC) quality is a broad concept that may be loosely defined as raising awareness of children's well-being and allowing for favourable developmental outcomes to be prioritised (Barros et al., 2016; Howes et al., 2008). Accordingly, it has been argued that ECEC quality can be impacted by child-to-staff ratios, group size along with staff training which is all relative to structural quality (Burchinal et al., 2010; Barros et al., 2016; Thomason and La Paro, 2009). While process quality is relative to proximal processes, specifically with regards to what children face on a daily basis, legislation and money have a major role in defining ECEC. As a result, ECEC consists of all the emotional, social, instructional and physical aspects of staff-child interactions and even in play, activities, or routines (Anders, 2015; Barros et al., 2016; Slot, Leseman, Verhagen & Mulder, 2015).

Education is critical for the health and well-being of children and adolescents, and it also has a long-lasting impact on their lives as adults (Hamad et al., 2018). D'Orville (2020) and Zhu & Liu (2020) have indicated that the global health pandemic has had a major impact on human life and education worldwide. According to Zhu & Liu (2020), 1.2 billion schools were affected, and children's education was isolated in 2020 as a result of COVID-related school closures, and 90% of all schools were closed between late March and April 2020. Furthermore, according to statistics obtained as of January 12, 2021, over 825 million children have been impacted by school closures as a result of the pandemic. UNICEF's monitoring indicates that 23 nations have enforced nationwide closures, 40 nations have adopted local closures, impacting half the world's students. Schools are already operating in 112 countries

worldwide (Atuahene et al., 2020). Accordingly, COVID-19 has devolved into a vast aspect that caused a loss of learning and the potential to diminish educational opportunities and has also led to various other practices being established (such as online learning) (Jandric', 2020). However, this study was conducted pre-COVID19. Therefore, the major changes that occurred were not accounted for in the study.

Consequently, the Covid 19 outbreak directly impacts this field of research. However, the fieldwork of this study was conducted prior to the outbreak, the meaning practice has likely evolved, and issues addressed may no longer be issued due to developments that have occurred. Nevertheless, the main aim of the thesis was not to address the specific practice but rather the impact of practice on early childhood; accordingly, outcomes are still relevant to current practice. Accordingly, throughout the thesis, references will be made to current practice due to COVID-19, but it will not be the main focus of the study.

The involvement of young children with popular culture occurs on a daily basis (Plowman et al., 2012). Despite this, technology integration in an early childhood setting remains a major challenge, with only one in four kindergartens in the United Kingdom having technology in place for children (Billington, 2016). Despite empirical evidence that technology is able to have a lot to offer in early childhood classrooms (Fleer, 2018; Gillen et al., 2018), there are considered to be various issues in relation to tools that are acceptable for young children to utilise (Dubicka, Martin, and Firth, 2019). Accordingly, when technology is integrated into childhood settings, it has been argued to be utilised ineffectively by staff (Mayne et al., 2016). Consequently, despite an increase in evidence with regards to children's non-school hour's engagement with a range of devices and platforms, technology in children's early learning has not yet been deemed necessary and highly beneficial (Johnston, Highfield, and Hadley, 2018). While screen time in schools should be discouraged, it is critical to understand how students interact with technology on a day-to-day basis and understand that technology

can be more engaging despite the lack of necessity (Billington, 2016). While some feel that children should be protected from the dangers of technology, other researchers (Dubicka, Martin, and Firth, 2019) have suggested the immense benefits that technology may give to those who utilise technology despite it not being able to guarantee any favourable effect on student learning outcomes (McFarlane, 2019).

According to Marsh and colleagues, technology use and what teachers regard to be critical components of young children's learning are frequently viewed as incompatible with early childhood teaching (Marsh et al., 2017). Many early childhood educators dispute the utility of technology in early childhood education (ECE), struggle to incorporate them into their practices, and lack adequate pedagogy to assist their integration into the early childhood classroom (Hernwall, 2016, Prestridge, 2017). According to Nikolalopoulou and Gialamas (2015), teachers frequently link technology use with free play and do not view children's use of technology as a potentially supported activity by adult participation (Thorpe et al., 2015). Additionally, there is little evidence that technologies are being incorporated into the curriculum in a way that fosters the development of inventive and creative activities within the framework of technological innovation. Hatzigianni and Kalaizidis (2018) discovered that, despite their desire to adapt, teachers continue to be sceptical of the use of technology in play and underutilize their pedagogical talents to support child-initiated learning with technology (Hatzigianni and Kalaizidis, 2018). Despite the fact that research on the use of technologies in ECE is still in its infancy, it has already highlighted a number of barriers that must be overcome before the technology can be effectively integrated into child-centred learning environments (Kewalramani and Havu-Nuutinen, 2019).

Kindergartens in Saudi Arabia accept children between the ages of three and six years. While kindergarten attendance is not essential, the proliferation of kindergartens indicates an increasing need for this early stage (Brodin and Renblad, 2020). According to the latest data

from Puri-Mirza, (2020), in the academic year of 2016-2017, there were around 3.27 thousand kindergartens in Saudi Arabia, enrolling over 373.86 thousand students. Thus, technology integration may be a critical subject to investigate and comprehend, as it has the potential to touch a huge number of students and teachers owing to its many advantages in the classroom (for instance, easing lesson planning and making lessons more interactive).

However, while governments attempt to promote technology in education, a critical component that has often been disregarded has been the teachers' views (Marsh et al., 2017). The purpose of this study is to ascertain kindergarten teachers' attitudes on the use of technology in the classroom in the Kingdom of Saudi Arabia. This chapter contains relevant information on my job and life history, thereby contextualising the research. In addition, this chapter discusses in detail the rationale for selecting the topic of kindergarten teacher attitudes towards the utilisation of technology among students in Saudi Arabia and justifies the gap that exists in the empirical literature.

Saudi Arabia has one of the highest rates of technology penetration in the world, now at over 70% (Statista, 2018). This equates to more than 23 million people (out of approximately 33 million) with access to and who make use of a range of technologies through the Internet. Research conducted by the General Authority for Statistics (2018) indicates that there are over 5 million children under the age of nine in Saudi Arabia. Over 80% of these children have access to technology at home and use it as a form of communication over the Internet (Larkina, 2017).

Saudi Arabia is classified as a high-income developing country with a GDP of \$843 billion (as of 2020) (Hassounah et al., 2020). Accordingly, Hassounah et al. (2020) have argued that Saudi Arabia's education system is one of the largest in the world, enrolling more than a million students yearly. The use of technologies in education came to the foreground during the COVID-19 pandemic, which heavily impacted educational institutions worldwide. As a

result, educational institutions, including schools, ECECs, colleges and universities, were forced to close down. As a result, nations have had to close schools to halt the virus's spread (Burki, 2020). Like any other country's education system, a sizable component of the Saudi Arabian education industry was negatively impacted by the pandemic's outbreak (Khalil et al., 2020). The Ministry of Education MOE has established a temporary emergency plan to oversee and support education virtually for secondary and university level students to keep the educational process running. The MOE has also attained a significant influence over educational processes in public schools through the use of online education platforms to promote the usage of virtual classrooms with appropriate digital content. Accordingly, Alshaikh et al. (2021) stated that Saudi Arabia has developed its own formal online school education network for the country's formalised learning with videos available on YouTube for all education levels.

ICT in early childhood education (ECE), especially kindergarten, has the potential to significantly improve children's learning by encouraging curiosity, discovery, cooperation, and creativity, as well as by aiding in the development of their problem-solving abilities (Saharon & Kerlitz, 2011). Correspondingly, this study is able to explore the potential of new platforms and technologies in ways that may be more effective than the conventional notions of emergent reading and typical literacy learning currently used in Saudi Arabia (Hammond & Wellington, 2013; Al-Hezam, 2017). In particular, in Saudi practice, learning through computers is seen as less effective, as it is considered too complicated for children (Larkina, 2017). These views in Saudi are likely a barrier to the implementation of technology, as technology can bring positive changes with it—for instance, improvements in problem-solving skills, collective learning, skill development, experimentation, social engagement, and an improved ability to learn effectively (Al-Shanawani, 2019; Al-Hezam, 2017). In ECE, there is also consistent evidence

of the positive impact of technology on children's learning, including play (Edwards et al., 2019; Wood et al., 2019).

Teachers must be involved in ensuring the successful integration of technology in and out of the classroom, as they have a significant impact on children and their learning processes and can influence the types of technology available in the classroom, how students learn, and how they perceive technology, all of which can affect their academic performance (Savage and Barnett, 2017). In addition, teachers' beliefs about using technology with children may also be one of the barriers that affect the integration of technology in the classroom. For example, teachers' beliefs may affect their ability to cope with other barriers they may face during using technology in the classroom (Blackwell et al., 2013; Ertmer, 1999; Ertmer et al., 2012). Therefore, a study of teachers' beliefs and attitudes regarding the use of technology to support learning and play is crucial in determining the success or failure and general impact of the use of education in kindergartens. Further, such a study provides an in-depth insight into teachers who are tasked with introducing technology to young children, and who can potentially shape their future interactions with ICT during the course of their educational lives.

Most studies based on technology in the classroom at the kindergarten level in Saudi Arabia concentrate on the importance of technology integration (Al-Shanawani, 2019; Al-Hezam, 2017; Al Kandari & Al qattan, 2020). In particular, this research tends to be based on the student's point of view (e.g., Al-Shanawani, 2019; Al-Hezam, 2017). As a consequence, there is a void in the literature about the teacher side of the equation, which deserves more investigation. More clearly, there are no published studies on kindergarten teachers' attitudes about technology in Saudi Arabia (to the best of my knowledge). Therefore, part of my intention in this research is to establish an overview of what has already been studied in the field and attempt to position my study within the relevant field (Hammond & Wellington, 2013).

Accordingly, this study may be able to positively influence Saudi Arabia as it can promote the application of new technology, specifically in ECE settings.

Information technologies are utilised within a majority of education systems today. Accordingly, the National Association for the Education of Young Children (NAEYC), (2012) has put forward the suggestion that the easier the utilisation of technology becomes, the more software for ECE can be developed to support children with their learning even at an early age. Furthermore, the NAEYC (2020) stated that when many schools and early care centres unexpectedly shuttered due to the COVID-19 epidemic in the spring of 2020, teachers were required to immediately significantly increase distant learning and family supports for the young children in their lessons, utilising their school's current technology capabilities. Building relationships is key to using technology to improve children's learning at home and school. Schools with established parental contacts and digital communication infrastructure were at an advantage. Other programmes needed to acquire new skills and formulate new plans as rapidly as possible. Teachers were required to evaluate what tactics and technology might improve involvement and cooperation in order to assist children learn throughout the curriculum. They also needed the support of families in order to effectively instruct students.

Chen & Chang (2006) also mentioned that in the childhood education context, computer technology is utilised in order to facilitate both teaching and learning. In addition, research suggests that computers typically improve the development of children's abilities, problem-solving, and communication skills (Haugland, 1992). Similarly, it has also been suggested by other studies that technology improves young children's literacy (Clements, 1994; Dodge et al., 2003) and mathematical skills (Clements & Samara, 2003).

Technology can be beneficial in ECE in multiple ways. It has been asserted by Judge et al. (2004) that educational software typically functions by adapting to children's learning, adaptability being a feature which the authors suggest has the most impact on learning. Further,

Gottschalk (2019) demonstrated that the integration of technology within the learning process is crucial because it may be a noteworthy component that bolsters the cognitive and social capacities of children. Similarly, Clements (2002) has argued that influential teachers typically utilise a wide array of teaching methods that allow each student to benefit from lessons by implementing a mix of online and offline activities throughout the lesson.

Furthermore, Haugland (2000) has suggested that learning can become more enjoyable when ICT is utilised as a valuable learning tool that can support learning activities. In this sense, it may be argued that teachers can integrate better improvements in the classroom (Ghaith & Yaghi, 1997). In addition, teachers are able to utilise computers to their advantage, as computers can be influential for children in enriching the learning process (Clements, 1999). Similarly, Judge et al. (2004) have suggested that computers play a major role in children's learning both at home and in school, which is why teachers see it as a highly influential learning tool. The years of childhood are critical periods of development and learning. Thus, teachers can support children in utilising technology and, as a result, simplify the use of technology later on in life (KabadayÖ, 2006; Bayhan et al., 2002; Haugland, 2000).

Considerable developments have been made in education (Baek, Jung, & Kim, 2008; Najdabbasi & Pedaste, 2014), and one influential factor is the wider availability of technology in education, and how to be effectively utilised to provide educational media to students (Kleiman, 2004). In addition, Bruce and Levin (2003) have suggested that technology becomes effective in a classroom setting by supporting communication, inquiry, and by aiding students' ability to self-express. It is argued that technology can allow the learning process to become more interactive and require more engagement.

On the other hand, there are a variety of reasons that technology is not always integrated into ECE settings—some relating to teachers and some relating to other challenges such as infrastructure. Researchers have pointed out that educational standards require teachers to

utilise ICT effectively to improve learning in the classroom setting (e.g., Baek et al., 2008; Koc, 2013). However, several obstacles block effective utilisation, including inadequate infrastructure and a lack of personal expertise (Mehlinger & Powers, 2002). Some studies have found that technology is not effectively used in certain learning facilities, which implies that technology may require fundamental changes in order to ensure that teachers and students have effective outcomes from these infrastructures (Tondeur, Van Braak, Ertmer, and Ottenbreit-Leftwich, 2017.; Najdabbasi, & Pedaste, 2014). Some final hurdles to effective utilisation include teachers' knowledge and beliefs, which are two significant barriers that are often mentioned in regard to comprehending why technology is used differently in preparing teachers to convey important information (Kim et al., 2013). Therefore, it is due to the scarcity of research on the subject that this study will explore teachers' beliefs about technology and how they may impact on the implementation of technology in their practice.

1.3 Background of ECE in Saudi Arabia and Role of Technology

Early education in Saudi Arabia was not valued in comparison to higher education until 1974, when preschool and kindergarten programmes were launched (Rabaah et al., 2016). The government officially incorporated pre-kindergarten and kindergartner programmes into the national curriculum after the success of a trial programme (improved student outcomes at the end of the year) in Macca (Aljabreen & Lash, 2016). This was caused by the need to improve the education sector of Saudi Arabia as part of its Vision 2030, which was established to remove the country's dependency on oil and provide the nation with a more stable economy (MoE, 2018). However, Infant education is not mandated in Saudi Arabia at the moment and is separated into numerous phases based on the child's age. The term "nursery" refers to the care of children under the age of three (MoE, 2018). Kindergarten or pre-primary education is designed for children aged three to six who have not yet entered the first grade of primary

school (MoE, 2018). Typically, in Saudi Arabia, boys and girls attend the same preschool and are taught by an all-female faculty (Aljabreen & Lash, 2016).

In 2018, the MOE indicated that the total number of kindergartens in Saudi Arabia is 3,684, and the ministry announced a strategic plan to establish 1,500 new kindergartens by the year 2020 and expand them until 2030. The Minister of MOE, Dr Al-Issa, added that the ministry has worked to include an initiative for this stage within the National Transformation Program and approved the initiative a budget of more than two billion Saudi Riyals (393,513,763 GBP) and aims to develop programmes for the expansion and improvement of kindergartens. Dr Al-Issa has previously set targets to increase enrolment rates to reach 30% of the number of students enrolled in the first grade of primary school by the end of 2020 and work to reach 70% by 2030 (Alghamedi, 2018).

When kindergartens became official and subject to MOE instructions in 1980, the MOE devised a self-learning curriculum based on the child's development trajectory and age-appropriate goals (Aljabreen & Lash, 2016). The self-learning curriculum provides children with the chance to choose activities that will assist them in exploring their world and developing their different abilities, while the teacher's involvement is limited to monitoring or guidance when appropriate (Alshahi, 2004). However, despite this, the curriculum has become weighted toward mathematics and literacy, with small elements of science (Rabaah et al., 2016).

At a kindergarten level, technology can be used as a way of augmenting instruction via the use of smartboards, broadcast technologies (radio and television), smart gadgets such as iPads, and mobile phones or tablets (Aseri, 2016). Although computers are insufficient (usually because schools possess obsolete machines) (Rabaah et al., 2016), the majority of primary schools have computer services available to students and teachers, with the latter receiving technology training at postsecondary institutions (Al Mulhim, 2014). There is a dearth of studies on kindergarten in Saudi Arabia on the degree to which teachers and students have

access to computers and other digital technologies (in the classroom and outside of the classroom). However, there has been a push for greater integration of engaging technology in the form of individual iPads, in part due to the success of an experimental phase at Layla kindergarten, which was deemed successful due to increased student achievement in subjects, such as maths, where problem-solving skills can be integrated (Alzannan, 2015). The rising emphasis on technology integration has necessitated the hiring of skilled teachers and the need to train teachers in order to implement technology into the classroom setting.

Saudi government leaders have stated that the nation must take crucial measures in order to diversify the knowledge-based economy and education that exists within the country. In other words, there is a need for an improvement in the education system (Murphy, 2011; Al-Abdulkareem, 2009). Furthermore, it was argued that these goals became more crucial than ever as education in Saudi Arabia was ranked 57th in the Global Competitiveness Report 2014–2015, conveying its need for modernisation and improvement (Schwab, 2014).

In particular, trained teachers are undeniably important in the progress of school improvement measures. Therefore, it is likely that Saudi Arabia will need to focus on its teacher training and ensure that the modules incorporate technology. However, with regards to current practice that exists in Saudi, some schools have started to adopt a Teacher Competency Test (TCT) which ensures teachers' ability in the classroom is sufficient, which is a major step forward for improvement in education and actually employing technology as it allows teachers to become more digitally aware and have a basic skill set on the way in which technology works (Aljabri, 2015).

Kindergarten teachers in Saudi Arabia are expected to have degrees in early childhood development or equivalent certification. Qualifications for teaching, on the other hand, have developed with time. Teachers participated in a training programme sponsored by the Gulf Girl Association in 1983. The Gulf Girl Association specialises in educating early childhood

educators with the theory and means needed for supporting children's learning and development. Two years later, in 1985, King Saud University established a Bachelor of Kindergarten programme with the goal of graduating students with a specialisation in kindergartens. As a result, a plethora of institutions and universities have followed suit, establishing programmes for kindergarten teachers, and educating them on how they can use technology in the classroom setting (Aljabreen & Lash, 2016).

In summary, since its inception in 1974, kindergarten education in Saudi Arabia has progressed significantly. Today's kindergartens have expanded swiftly and become more diverse. Early childhood educators' curricula and professional certifications have also been altered to match the expanding educational system's demands. However, the incorporation of technology into kindergartens has undoubtedly been a significant strategic step toward ensuring that the educational system fulfils not just student needs but also worldwide standards in the sector. As a result, it is critical to examine teachers' ideas about this integration in order to enable a successful teaching process. The next subheading defines what it means by 'technology' in the thesis.

1.4 Digital technologies

In this study, digital technologies are described as those that employ various types of software and hardware to produce, store, distribute, and display information (Rice, 2003). Computers, tablets, and smartphones are all examples of digital devices (Vuorikari et al., 2016), and the items seen, utilised, or generated on such devices (e.g., websites and apps) are all examples of digital technologies (Plowman, 2016).

It is critical to differentiate between digital and analogue technologies. Analogue technologies concentrate on generating representations of the world, whereas digital technologies strive to process information digitally, which may be stored and utilised for a

variety of purposes (e.g., sharing information, entertainment, and communication) (Mantilla & Edwards, 2019).

1.5 Definition of technology

This study's terminology was briefly clarified first. The terminology "information and communications technology" (ICT) was originally used interchangeably with "computer technology." Today's children use computers, desktops, and mobile technologies before they begin reading and writing (O'Hara, 2011). In addition to computers, digital cameras, game consoles, and programmable toys all integrate a variety of ICT and are thus accessible to children. The education of young children can be facilitated by various technologies, such as computers, email, the Internet, word processing and graphics software, and mobile phones (Parette & Blum, 2013). There are many different ways to define technologies, and a definition of information and communication technology that encompasses more than just a desktop computer is necessary for many of the scenarios in which play, and ICT seem to coexist well (Howard, Miles & Rees-Davies, 2012). The terms "computer play", "ICT play" and "digital play" refer to the activities in which children engage with computers, touch screens and other information and communication technology to gain knowledge and skills. Computer and information computer play is not limited to video games; rather, digital play encompasses a wide variety of commonplace electrical gadgets and toys that, when engaged by the child, provide a corresponding reaction (Arnott 2013). As described by Sharapan (2012), technology enables educators to capture, store, and disseminate their lessons, and has been identified as a resource that students can use to enhance their learning and growth. Young children have access to a variety of technologies, including but not limited to television, films, Internet, video games, tablet or smartphone applications and games, and related products such as books, toys, or physical games featuring popular characters or brands.

There are several advantages to introducing technology to preschool and primary school children as early as age three. Technology is being used in the classroom for various purposes, with teachers augmenting the curriculum and introducing new methods of instruction. The delivery of education on letter sounds, narrative comprehension, word reading, and other early literacy skills necessary to be successful in today's society are being aided by teachers' use of technology such as eBooks, iPads, and computers (Marsh et al., 2016). While reviewing studies on technology usage, researchers discovered mixed results showing excellent and negative consequences for children using technology to develop literacy skills. These evaluations provide suggestions that assist in identifying why and how teachers employ technology in their classrooms (Undheim, 2022).

The use of educational technologies, such as computers in preschool classrooms and bedtime readings on tablets, has become a part of the lives of a significant number of young children (Mertala, 2019). Although these so-called digital native children, also known as the iGeneration, are in constant touch with technology, very little is known about the unique educational affordances of these technologies and how beneficial they are for children's learning compared to conventional print materials. It is of the utmost importance to determine how (or whether) electronic books (eBooks), particularly enhanced features that allow for story listening without another person present, affect young children's reading. Reading is a foundational skill essential for later academic success and the functioning of society. Most of the research on eBooks and educational outcomes is conducted using computer-based eBooks and school-aged children, although the body of knowledge is expanding (Nikolopoulou and Gialamas, 2015). Children of considerably younger ages can now utilise eBooks, including enhanced eBooks (those having read-to-me and additional choices), as a result of the widespread availability of touch screen technology in most families. On the other hand, there

is a paucity of data about the consequences of reading eBooks on tablets, in particular with respect to special needs and capacities of young children's developmental processes.

According to Erstad et. al. (2020) “digital technology” encompasses not just electronic gadgets and resources but also digitally-produced texts and visuals: The term “digital tools” may apply to many different kinds of computers and tablets, as well as cameras, interactive displays, and devices for programming and other forms of digital creation. The term “digital resources” refers to the many forms of digital material, such as applications and software that may be downloaded and internet content used in conjunction with the children.

1.6 The Role of Technology in ECE and the Beliefs of Teachers

Technology can impact early cognitive development within all individuals (Judge, Puckett, & Bell, 2006; United Nations Educational, Scientific and Cultural Organization (UNESCO), 2010). For example, the use of computers within kindergarten may be different from the use of computers in higher grades, as children’s reading and writing abilities begin to improve and are typically only based around visual representations and auditory aspects. However, utilising technology arguably has the most potential to improve children’s cognitive skills, including their visual, abstract, or even their mathematical-logical skills such as their creative thinking, motor-visual coordination, literacy development, memory, metacognition, and vocabulary (Elumalai et al., 2021; Khan et al., 2018; Srivastava and Haider, 2020; Saharon & Kerlitz, 2011). In addition, ICT has been suggested elsewhere to have the ability to promote meaningful interactions among children, i.e., it can allow for dialogues in manners that improve children’s conversational skills (Hsin, Li, & Tsai, 2014). Accordingly, it has been suggested by various individuals that the use of technology is effective for children in kindergarten (Hsu, 2016).

On the other hand, it is possible that the implementation of ICT in kindergarten may lead to an increase in questions and fears about children’s social development and functionality

in social situations, as it has been suggested that technology can also invoke depression or violent behaviour that can impact children's social development (National Academies of Sciences, Engineering, and Medicine, 2019; Madigan et al., 2018). This may lead to concerns about the adverse physical effects of children's extended computer use and has ultimately caused schools to fear implementing technology. Similarly, it has been suggested that Internet users may cause children to be exposed to content that may potentially harm the child psychologically and, in some cases, can cause them to fear electronic devices (Armstrong & Casement, 2000; Cordes & Miller, 2000).

Teachers' beliefs are particularly important and influential, with beliefs being defined as a collection of attitudes and values (Ottenbreit-Leftwich et al., 2010). Correspondingly, beliefs typically influence practice, as they impact how much an individual agrees with a particular aspect (Tondeur et al., 2017). Consequently, beliefs impact the goals and choices individuals set for themselves (Najdabbasi, & Pedaste, 2014). In this case, teachers' beliefs impact the integration of technologies into teaching, which implies that if teachers agreed with implementing technologies, they would likely attempt this in their classroom effectively (Kim et al., 2013). In addition, teachers' beliefs in relation to technology are considered to be fundamental, as they can support teachers in achieving the instructional aims that they consider to be the most crucial (Watson, 2006; Ottenbreit-Leftwich et al., 2010). Similarly, teachers' beliefs regarding teaching and learning are highly influential for students (Ertmer, 2005; Bice, & Tang, 2022). As a consequence, each teacher's set of beliefs ultimately impacts the outcomes of student learning and how much they can improve when utilising technology (Ertmer, 2005; Bice & Tang, 2022). On an academic level, there is sustained interest in exploring teachers' beliefs, particularly beliefs relating directly to education, self-efficacy, and value, each of which often impact how technology is applied in the classroom (Koc, 2013; Ottenbreit-Leftwich et al., 2010). Kim et al. (2013) have suggested that there is a difference in researchers' study of

beliefs which are linked with technology compared to the belief systems of teachers on the use of technology in the classroom.

It is crucial for teachers to possess the skills that can allow them to be technologically capable and to effectively conduct lessons; teacher skills can thus in turn improve the effectiveness of technology implementation in classrooms (Lawless & Pellegrino, 2007; Van Dijk & Kattmann, 2007; Ertmer & Ottenbreit-Leftwich, 2010; Bice & Tang, 2022; Tondeur et al., 2017). In addition, it has been asserted by Lawless and Pellegrino (2007) that technology has become a basic tool in teaching, and is, they suggest, required globally, as it provides students with different ways of learning. However, despite the requirement for technological skills for teaching, the majority of teachers, particularly those who teach in developing nations or those who teach lower year groups, tend to lack basic ICT skills (Lawless & Pellegrino, 2007; Najdabbasi, & Pedaste, 2014). Nevertheless, despite teachers in certain countries not having adequate ICT skills, many teachers continue to believe that technology may aid them in more effectively completing professional and personal duties (Van Dijk & Kattmann, 2007; Ertmer & Ottenbreit-Leftwich, 2010; Al-Misbahi, 2020).

1.7 The Challenge of Using Technology in Teaching a Classroom in Saudi Arabia

Challenges arise when integrating technology into ECE in Saudi Arabia, partly because of the lack of guidance on appropriate pedagogy (which means that relative to other nations, it would be harder to adapt technology into education). Al-Harbi (2011) suggested that technology in education in Saudi Arabia has still not been effectively implemented due to a severe paucity of information surrounding teaching strategies and how they can be implemented to improve the learning outcomes of students. Since 2011, as noted previously, the uptake and use of digital technologies in Saudi Arabia have increased substantially, and technologies have become more powerful and more mobile. Accordingly, Saudi Arabia has established that there is a severe need for a national plan that can enable schools to adopt ICT

facilities across the entire country. Accordingly, the government established a plan which recommends that the implementation of technology and home learning should occur within the education sector, beginning from kindergarten and progressing into higher education, as this would ensure that the most progress occurs during the process of implementation. Accordingly, in the year 2009, Saudi Arabia hosted its first national conference on e-learning and home learning, organised by the MoE; this conference led to numerous changes, as it allowed the Saudi government to see that a crucial part of education was missing. The following year, a list of all the institutions in Saudi Arabia that required improvement and the implementation of e-learning was published. Consequently, in 2011, King Abdullah Ibn Abdul-Aziz Al Saud and the chairman of the MoE approved the improvements which schools were experiencing regarding the implementation of ICT over time.

1.8 The infrastructure for the use of technology in Saudi Arabia

Investment in technology in education has become a priority for the government of Saudi Arabia, as it now represents a third of the existing education budget (Al-Misbahi, 2020). Nevertheless, the improvements appear to be slow, and the implementation of technology in schools is still at its early stages in Saudi Arabia, meaning there is still a need for further funding and faster distribution of technology. Al-Maini (2011) asserted in one study that there is a lack of classroom computers in the majority of classes in Saudi Arabia. However, there have been recent developments in the education sector, as funding increased to, in 2021, an estimated expenditure of 186 billion riyals (36,877,722,487 GBP) in education, which enables new infrastructure, including enabling more modern schools to be built and digital technologies for schools to be developed. The government is thus now rapidly developing infrastructure in the majority of education arenas (Al-Misbahi, 2020).

1.9 Research Questions

This study addresses the three following research questions:

- 1) What are the beliefs of kindergarten teachers regarding the use of technology with children in Saudi Arabia?
- 2) What are the factors influencing the beliefs of kindergarten teachers on the use of technology for educating children in Saudi Arabia?
- 3) What are the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children from kindergarten teachers' perspectives in Saudi Arabia?

1.10 Aims of the research

The aims of this study are as follows:

- To understand kindergarten teachers' attitudes about technology in education and how such attitudes affect technology integration in the classroom.
- To determine what aspects of teachers' views contribute to the perpetuation of unfavourable attitudes which impede the adoption of classroom technology in classroom practice.
- To understand the association between teachers' pedagogical beliefs and their knowledge of the integration of technology as a way of improving technology use among kindergarten children.

1.11 Objectives of the research.

- To explore teachers' beliefs with respect to the use of technology in the teaching of kindergarten children through the use of interviews.
- To understand teachers' pedagogical roles and actions when using technology in their practice.

- To explore factors that can affect the integration of technology in the classroom.
- To explore enablers that contribute to kindergarten teachers utilising technology in their practice.
- To explore the barriers that impede kindergarten teachers when utilising technology in their practice.

1.12 Significance of the Research

There is currently a lack of studies on technology in the education of kindergarten-aged children. However, the current studies which do exist show varying results (Fox, 2020; Aljaberi, 2021; Schriever, 2018). Therefore, despite some literature, there is still a research gap to be filled by this study, specifically in the context of kindergarten education in Saudi Arabia.

To begin, the study will uncover variations in kindergarten teachers' views that impede the integration of technology into education. It will also provide suggestions that will be critical for educating decision-makers and strengthening policies for various parties (parents, students, teachers and other education professionals) as technology can have a major positive effect in the classroom due to its ability to change the education process to each student and to allow students to have success while still maintaining efficiency. Moreover, being the first study of its kind in Saudi Arabia, the findings offer a unique insight into the challenges of technology integration and kindergarten teachers' beliefs regarding technology.

In addition, the study may also promote interested educators and educational institutions to understand the main benefits of digital tools and devices in their pre-service and in-service training programmes and can aid in designing pedagogical approaches that foster a variety of understandings of digital technologies among young students, including coding and other technical skills, as well as research-based knowledge. The study will also advocate for the increase of funding for schools.

Accordingly, the study is also important as it can improve the curricula for ECE. Digital technologies can promote collaboration, networking, social engagement, and the production of texts and ideas that can all be encouraged as forms of informal educational environments and informal learning spaces.

1.13 Summary

The study findings might encourage and support the use of technology within the education system. Additionally, it might encourage policymakers to understate and solve issues that are specific to teachers in the Saudi school system as these would allow the implementation process of technology to become simple and to have the most impact possible. Therefore, this study has likely encouraged further researchers to contribute to the literature around the topic of exploring the effectiveness of technology and the potential ways it can be implemented throughout the whole education system in all other areas of Saudi Arabia. In the next chapter, I discuss the literature review which explores the main theoretical arguments and results of other studies.

1.14 Structure of the Thesis

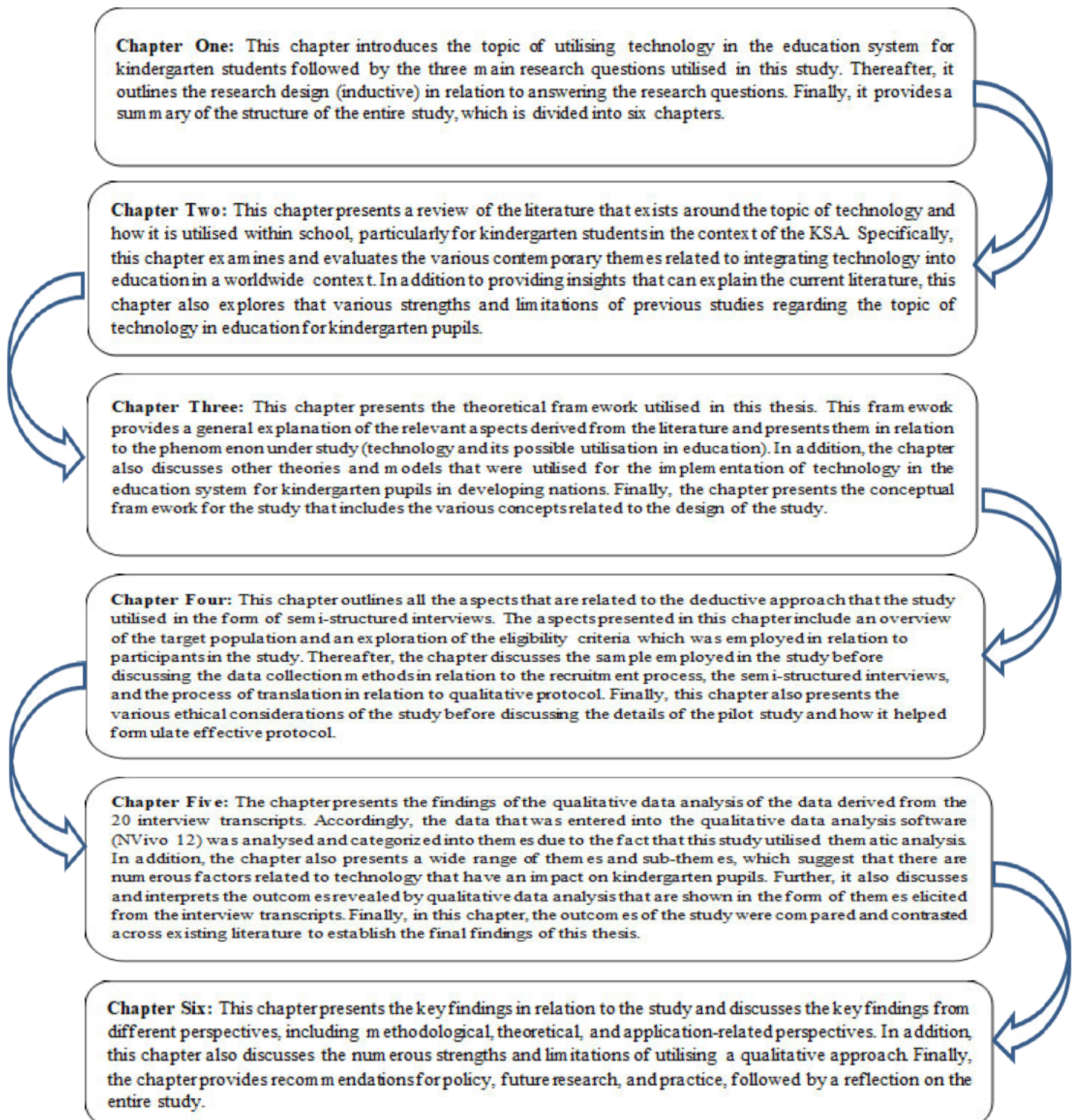


Figure 1-1 - Structure of the Thesis

2 Chapter Two: Literature review

2.1 Overview

This chapter begins by outlining the focus of the study and some broader context by providing background information regarding barriers and enablers influencing the implementation of technology in the teaching of preschool aged children from teachers' perspectives. I explore the existing corpus of relevant literature to provide insights by comparing and contrasting their purposes, study designs, techniques, and findings. I then situate the current study within the existing body of knowledge to show how my research fills a gap in the relevant literature. As such, the present study addresses the following research questions, which have guided the focus of the literature review: "What are the beliefs of kindergarten teachers regarding the use of technology with children in Saudi Arabia?" "What are the factors influencing the beliefs of kindergarten teachers on the use of technology for educating children in Saudi Arabia?" "What are the barriers and facilitators that influence the implementation of technology in teaching of kindergarten children from kindergarten teachers' perspectives in Saudi Arabia?"

I begin by explaining how the literature review was conducted and defining some core terms relevant to the study. I subsequently explore relevant literature in relation to my research questions. More specifically, I first examine what is known about teachers' positive beliefs about using technology, then what is known about teachers' negative beliefs about using technology, followed by what is known about the factors influencing teachers' beliefs, and finally, what is known about the barriers and facilitators influencing the implementation of technology in the teaching of kindergarten children. Since scholarly literature specifically addressing these questions in Saudi Arabian context is limited, the literature review considers these topics in relation to international literature. Where possible, the literature also focuses on examples in the context of early childhood.

2.2 Searching for Literature Using the Appropriate Database

Though the initial search focused on 2010–2021, earlier studies and sources were also included where relevant. The period chosen for examining relevant studies published in English was within the last 11 years of 2010–2021, as it was thought that this was the most fruitful period for technology integration inquiries for ECE (Mertala, 2016), with the rise of advanced devices and programmes in preschools all through the 2010s clarifying this propensity (Blackwell, Wartella, Lauricella, & Robb, 2015). The primary investigations were made utilising all significant databases accessible through the author’s university library administration; this provided a broader scope of studies to focus on. The following databases were utilised to seek important articles: ProQuest (including ERIC, Social Science Premium Collection), Web of Science, and Cochrane Library. Reverse reference checks for qualifying databases were carried out by checking the publications’ references; forward reference checks were carried out utilising Google Scholar’s ‘cited by’ search functionality. Search words were chosen to reflect the differences between the terminology of ECE settings. Phrases such as *preschool*, *early childhood*, and *kindergarten* were searched, as well as *teachers* and *kindergartners*. Further multifaceted searches included *data and communications technology* or *ICT*, as well as *computerised*, *computer*, *digital*, or *tablet*. To achieve these variable-based searches, this study used Boolean searches (which provide variables to searches and are expressed using *and* and *or* between terms).

2.3 Glossary of Research Terms Related to the Topic

For the present study, the following definitions have been employed:

Technology refers to a collection of physical devices and software programmes that work together to capture, store, display, and disseminate information electronically (Wahab,

Rose, & Osman, 2011). Technology integration refers to using technology for learning, play and teaching (An & Reigeluth, 2011).

The description signifies of the definition of beliefs used in the thesis as ‘psychologically held understandings, premises, or propositions about the world that are felt to be true’ (Richardson, 2003, p.2). This commonly used characterisation serves as this review’s definition of beliefs since it effectively conveys the multifaceted nature of views. Beliefs refer to a collection of conscious or subconscious predispositions for a specific topic or object that often influences one’s attitude, viewpoint, and behaviour toward that subject or object (Österholm, 2010). As argued by Fives & Buehl (2012), states of mind, values, judgments, maxims, conclusions, belief systems, discernments, conceptions, conceptual frameworks, previously established inclinations, understood speculations, unequivocal speculations, individual speculations, and inner mental forms are a list of concepts that are utilised to demonstrate beliefs in literature. Beliefs are defined in this thesis as formed by coincidental and recounted perceptions, as well as authentic, material, and social circumstances (Nuttall et al., 2015).

Kindergarten Teachers refer to anyone charged with the role of teaching children before they enter primary school. In Saudi Arabia, children under kindergarten teachers’ care are typically under six years old (Rabaah, Doaa, & Asma, 2016).

The main aspect discussed in the coming sections is the background of this study.

2.4 Teachers' beliefs

Teachers’ beliefs have been studied for over 60 years, and there is strong evidence that their beliefs are essential in directing their decisions and behaviours in the classroom (Ertmer et al., 2012; Mama & Henessey, 2013; Ashton, 2015; Bice & Tang, 2022). Teachers’ beliefs are assumed to affect both how and why they modify their methods to grasp a modern educational program, embrace unused education techniques, and actualise new activities; this

makes educator beliefs a vital matter to ponder within the setting of technology integration (Biesta, Priestley, & Robinson, 2015; Tondeur et al., 2017). Teachers' educational beliefs tend to be a key predictor of their technology usage (Ertmer et al., 2012; Miranda & Russell, 2012; Tondeur et al., 2017); nevertheless, these ideas might operate obstructions to technology integration (Tondeur et al., 2017). If an educator believe that coordinated instruction is a practical education method, the open nature of (specific) technology solutions may be pedagogically undesirable (Donnelly, McGarr, & O'Reilly, 2011).

Despite the significant number of studies, research concerning teachers' beliefs about technology has a primary limitation. In the present study, I wanted to take a holistic approach to study teachers' perspectives, building upon previous research that examined teachers' roles (Kim et al., 2013). The majority of innovation integration research focuses on the role of technology in teaching and learning rather than on a wide variety of other topics (such as information, their students, the environment in which they operate, subject matter, ethical difficulties, and social issues). (Biesta et al., 2015; Jääskelä, Häkkinen, & Rasku-Puttonen, 2017; Mertala, 2019).

Focusing exclusively on beliefs around learning and instructing falls short of appreciating the multifaceted and complicated nature of being (and becoming) an educator, given the wide range of beliefs held by teachers. In Lasky's (2005) research, secondary school teachers stated that they must educate the child as a whole, implying that in addition to supporting students' scholarly development, educators have the added role of caring for their students' socio-emotional well-being. In other words, educators make judgments based on a comprehensive understanding of children, the teaching process, and the core of institutional education itself, rather than only on views about how children learn.

Previous examples of investment in education technologies have shown positive results to the investments. One study regarding the involvement of ICT in classrooms carried out in 28 nations in Africa, Asia, Europe, and South and North America discovered that ICT could alter the forms of learning in classrooms (Law, Pelgrum, & Plomp, 2008). Nevertheless, it has also been found that employing educational technology programmes is not always easy (Atabek, 2019). A study conducted by the Organization for Economic Cooperation and Development (OECD) examining 70 countries found that student learning success (being able to achieve in school) was increased in countries that invested in educational technologies (OECD, 2015). According to Reborá (2016), most teachers in developing nations cannot realistically utilise technology to its full potential due to their lack of experience (Guzey & Roehrig, 2012) and due to being uncertain about how they should utilise technology to support their teaching (Semiz & Ince, 2012).

The effect of today's sophisticated information technology on life comfort, teaching, and learning creativity is highly significant (Yeh, Chang, & Chang, 2011). Teaching has much to do with fostering young children's optimal growth and effective learning, according to NAEYC's Developmentally Appropriate Practice (DAP) (Yeh, Chang, & Chang, 2011). In this age of technology, there is likely a need to change teacher beliefs in early education as it may lead to improvements in teaching and children's learning (Chou, 2012). Education is considered to be the basis for national prosperity as it provides the nation's general population with knowledge and capabilities which may improve national competitiveness. Ale and Chib (2011) and Chou (2012) have suggested that teachers who use technology effectively in their practice tend to have positive attitudes towards it based upon their values or beliefs, and that these practices can lead to positive impacts on children's learning. This is why the beliefs of teachers could have a significant impact on overall educational achievement.

Technology in education can be used as a way for teachers to assess the educational success of their students. Effective teaching, as a result, combines a variety of instructional approaches to achieve positive educational outcomes. In the Northern hemisphere, much emphasis is put on integrating technology into ECE (Ale & Chib, 2011; Chou, 2012). According to Chou (2012), if schools can combine ICT with curricula, books, and manuals, by integrating ICT and learning apps, ICT can become an effective instructional and learning aid for early childhood educators.

Furthermore, Kontovourki et al. (2017) examined the need to have good practice regarding implementing technology in a kindergarten setting. They found a positive correlation in the relationship between teacher views on technology and teaching competency, which, they argue, is likely due to the teachers' willingness to improve their practice. Teachers' belief is defined as teachers' psychological intention or views concerning the teaching process (Lin, 2009). Teaching focuses were divided by Wu (2009) into three categories: student-centric, teacher-centric, and cooperation-with-students-centric. The former can be said to focus on children's active learning, where teachers do not actively interfere or intervene. Teacher centric is when teachers lead learning while students receive knowledge, and cooperation-with-students centric is the emphasis on the ongoing relationship between teachers and students. The following section examines pedagogy and curriculum development in kindergartens in Saudi Arabia.

2.5 Development of pedagogy and curriculum in kindergartens in Saudi Arabia

Alameen, Male, and Palaiologou (2015) stated that the expansion and evolution of techniques and the curriculum in the domain of ECE in Saudi Arabia occurred in stages, beginning in 1952 with a traditional approach centred on individual and independent practices. This stage was further reviewed in 2005 with a developmental approach to ECE that emphasised group and cooperative activities (Alameen, Male and Palaiologou, 2015).

Additionally, the second stage began in 1975 with a project-based method that was similar to utilising a conventional strategy as it had a major emphasis on a child's abilities to write and read (Rabaah, Doaa and Asma, 2016). The third stage was implemented in 1986 when the self-learning curriculum concept was developed. As a result, Alameen et al. (2015) asserted that having a comprehensive and integrated pool of kindergarten teachers who possess a breadth of understanding of the subject matter of pedagogy, knowledge of the development of children, and technical knowledge allows teachers to be able to comprehend the needs and characteristics of preschool children which is increasingly critical in the field. As a result, the three stages reflected the educational movement away from teacher-centred pedagogical methods toward learner-centred pedagogical approaches, necessitating the need for teachers to remain adaptable throughout their careers.

2.6 ECE Goals in Saudi Arabia

According to Aljabreen & Lash (2016), Saudi Arabia's education system is governed by a range of regulations, including those aimed at ECE and expanding children's experiences in their own families. According to Aljabreen & Lash (2016), schools are the effective venues for children to develop the rigour and discipline necessary for subsequent life success. Due to the school environment, it is possible for children to develop socially in the context of connections with their classmates. According to the findings of a study conducted by Qadri, Nourallah, and Spleth (2012), preschool or kindergarten in Saudi Arabia must provide children with the opportunity to understand the benefits of positive Islamic examples effectively through instruction and simulation without requiring excessive work. Additionally, the authors asserted that ECE programmes should incorporate a variety of linguistic expressions appropriate for the children being taught. A visually appealing and inventive kindergarten atmosphere enables children to grow healthily and vigorously. In Saudi Arabia, preschool and ECE programmes

are built on the guiding principle that curriculum at this level must be suitably connected with stated goals (Kashkary & Robinson, 2006).

In addition, Kashkary and Robinson (2006) suggested that a curriculum be described as a collection of experiences that have been rehearsed and prepared in advance, as well as activities that allow students to accomplish academic objectives that are suitable for their abilities. As Kashkary and Robinson (2006) noted, one of the objectives of the Saudi Arabian ECE curriculum should aim to encourage learning as well as growth across all relevant areas, including cognitive, physical, social, and psychological, which aligns with the objectives of a large number of other curriculum frameworks worldwide, including those in other countries. Accordingly, the developed Kindergarten Curriculum aligns with these objectives and allows for different areas of learning that it covers and the pedagogical approach of adult-led and child-initiated activities.

2.7 Early childhood educators' Positive Beliefs about Using Technology

Since less has been written on the attitudes, beliefs and practices of early years educators, this section draws primarily on literature about teachers of older children. Teachers' beliefs and attitudes are two of the most powerful influences on students' work (Connelly & Clandinin, 1988; Nespor, 1987; Pajares, 1992). Beliefs play an important role in the work of teachers. Through more than 60 years of history, research on teacher beliefs provides strong evidence on how beliefs guide teachers' choices and actions in the classroom and impact their incorporation of new curricula or teaching strategies (Biesta et al., 2015; Fives & Buehl, 2012; Levin, 2015). Teacher attitudes towards new technologies were found to be connected with their trust and belief in the management of their current schools and the facilities available to them (Al-awidi & Alghazo, 2012; Apeanti, 2016).

Studies on the use of technology in kindergartens have argued that there is a positive link between constructivist teaching and the effective implementation of technology in the

education system (Fenty & Anderson, 2014; Hsin et al., 2014). Furthermore, through utilising technology in kindergarten positive social and emotional behaviours in children may be promoted as well as improve their cognitive ability if implemented correctly (Edwards, 2013). A comparative study by Zaki (2013) has also shown that the difference between kindergarten teachers in Australia and Malaysia was that teachers in Australia knew how to utilise ICT and generally held a positive belief that the Internet can provide crucial learning opportunities for children. Accordingly, teachers' beliefs concerning ICT in developing nations were mainly based on the usefulness of ICT in kindergarten and the limitations of implementing technology in kindergarten (Zaki, 2013). Accordingly, teachers' beliefs in relation to ICT in developing nations were mainly based on two factors—the usefulness of ICT in kindergarten and the limitations of implementing technology in kindergarten (Zaki, 2013). Additionally, beliefs are a significant influencing role in a variety of fields of education (Borg, 2003; Galvis, 2012), particularly in technology where teachers' beliefs are impacted by the effectiveness of student outcomes due to their major role in managing student learning (Ertmer, 2005; Galvis, 2012; Tondeur et al., 2017).

There are many positive beliefs about using technology in a classroom setting. In a study of 18 in-service preschool teachers in Turkey, Kara and Cagiltay (2017) found that majority trained teachers held positive beliefs about what they described as 'appropriate technology use' (p. 119). Yurt and Cevher-Kalburan's (2011) study also found that many teachers have positive attitudes towards classroom technology. A fuller explanation of early childhood teachers' positive beliefs toward technology integration requires a review of research on the ways that these teachers justify their beliefs (Pajariato, 2020; Breffni, 2011; Polly, 2014). To this end, these justifications are separated into several categories discussed separately in the following subsections.

Teachers who believe they had been provided clear guidance were shown to develop more positive attitudes towards technology use, which in turn led to increased use (Rehmat & Bailey, 2014). Research into the self-efficacy of preschool teachers could provide insight into their trust in integrated technology and may thus enable better preschool teacher training. If it can be demonstrated that technology helps teachers and saves time in processes like lesson planning, then teachers may be more likely to have a positive overview of technology (Lemon & Garvis, 2016). Furthermore, efficient technology training may lead to the development of positive attitudes and expectations among teachers (Apeanti, 2016).

Barak (2017) discovered that teachers' aptitudes for using technologies improved over time in a study conducted between two preschool teacher cohorts. Teachers in the first cohort portrayed new technologies as ineffective devices and programmes that undermine teachers' power and cause classroom disruptions (Pajarianto, 2020; Breffni, 2011; Polly, 2014). On the other hand, the second group of teachers stated that emerging tools help to maximise teaching and learning opportunities. Another study involving primary school teachers revealed considerable excitement about using blogs to teach foreign languages (Al-Qallaf & Al-Mutairi, 2016). Students were found to be more inspired, to act independently and write longer sentences with fewer spelling and grammar errors due to these new tools (Al-Qallaf & Al-Mutairi, 2016).

Certain studies showed that the states of mind and beliefs of teachers in utilising ICT were not based upon accessibility alone, as many teachers are already dependent on ICT to assist educators (Wastiau et al., 2013). Reinforcing the significance of teachers' beliefs, other studies have suggested that, with ICT being required for learning, teachers' confidence and conviction have become the main drivers of technological integration, and they thus ultimately affect students' trust in these new technologies (Al-awidi, & Alghazo, 2012; Wastiau et al., 2013).

2.8 Teacher attitudes toward integrating technology

A review of technology integration in scientific education in the Yanbu district of Saudi Arabia shows that teachers who took part in 38 training programmes use technology for pedagogical purposes more often than teachers who took no training. It was also found that teachers who have used technology more extensively believed positively in the usage of technology (Al-Alwani, 2005). An inquiry into students attending Saudi Arabian teacher Colleges' demands for computer training showed that most (90%) of student teachers were willing to obtain computer training to help them in the future (Alasimi, 2018). A further obstacle to the use of technology in educational activities in Saudi Arabia—as is the case in other industrialised nations—is the shortage of time in class; time delay is a worldwide difficulty in the use of technology (Al Mulhim, 2014, Alasimi, 2018). Other works have shown the attitudes of Saudi elementary teachers towards technology. The outlook is usually positive, but perhaps due to a shortage of time available to use technology in the classroom, teachers' actual usage of technology for educational purposes was low (Al-Rashed, 2002). Each lesson only lasted 45 minutes, making teachers believe that using the traditional way of teaching would cover more things than using technology in that period (Al-Rashed, 2002). Results also showed that teachers had no time to attend technical training sessions (Al-Rashed, 2002). Fifty-three teachers from ten high schools in Riyadh city have identified numerous issues limiting their usage of technology. First, 45 minutes were too short to allow technology to be implemented in their courses. Second, many teachers (39) worried that they would lose control of their lectures if they used digital tools (Aldossry, 2011). Beyond this, the lack of access is another hurdle for Saudi Arabian teachers in the use of technology in education. One study found that integration was limited in schools due to the absence of equipment, hardware, and Internet connectivity (Al-Rashed, 2002). Although the MoE has proposed digital tools for classroom

use, one study found that teachers rather use digital technology primarily for evaluation and documentation (Al-Alwani, 2005).

2.9 Teachers' beliefs and technology

According to the findings, there is a substantial correlation between early childhood teachers' beliefs and attitudes with regard to how technology is conceptualised and utilised in early childhood settings in relation to children's play (Edwards, 2016). As a result, effective teaching approaches, for instance, ways of thinking (Bird and Edwards, 2014), are able to influence teachers' conceptualisation of specific tools and resources to support learning, for instance, how technology is utilised or not used, with students (Ertmer, Ottenbreit-Leftwich, and Tondeur, 2015). Furthermore, Mertala (2017) has suggested that it might be challenging to integrate technology into ECE due to the curriculum's framework and emphasis on first-hand, experiential, child-initiated learning. Similarly, Flewitt, Messer, and Kucirkova (2014) also added that laziness, physical inactivity, along with an overall lack of linguistic development are considered to be major worries with regard to children's use of technology, which is considered to lead to parental anxiety. Accordingly, aspects were worsened by worries in relation to developmental suitability in technology-based virtual learning experiences in comparison to traditional hands-on activities that do not include technology (Bird and Edwards, 2014; Lindahl and Folkesson, 2012). Similarly, Nuttall et al. (2013) also suggested that given the critical role of play in early childhood learning, teachers' pedagogical beliefs and their perceptions of what is important for child development will influence how they employ technology to support the educational aims.

Many young children grow up in environments where a range of technologies are integrated into their day-to-day lives (Arnott and Yelland, 2020; Danby et al., 2018). For these children, technology has always been present and impacts every aspect of their life (Robinson & Lee, 2011). However, Yelland (2017) has asserted that the use of digital technology has

substantially increased in society, meaning reassessment must occur on how children use the technology at home and in ECEC institutions as the impacts of it may not all be positive. Accordingly, children using technology require supervision and support from proximal teachers in ECEC, teachers who conduct critical reflections on the potential and constraints of integrating digital technology, and teachers who consider when, how, and why they use digital technology with the children (Jernes and Engelsen, 2012; Stephen and Edwards, 2018).

Numerous studies have asserted that there is a current lack of understanding among educators on how to integrate technology into play-based teaching (Jack and Higgins, 2019; Johnston, Hadley, and Waniganayake, 2020; VidalHall, Flewitt, and Wyse, 2020). Additionally, teachers in various studies have suggested an existing need for further professional help in relation to the pedagogical uses of digital technology in ECEC (Jack and Higgins, 2019). Teachers in several studies received guidance and support throughout the research process as they learned how to use and integrate specific technologies into their practices; teachers in these studies regularly acknowledged that these debates and critical reflection were vital to their technical and pedagogical professional advancement (Johnston, Hadley, and Waniganayake, 2020; Vidal-Hall, Flewitt, and Wyse, 2020). On the one hand, teachers' familiarity with digital resources affected how technology was integrated into classroom instruction (Jack and Higgins, 2019). In addition, Vidal-Hall, Flewitt, and Wyse (2020) found that integration of technology was delayed not by a lack of comprehension alone but by the way teachers' pedagogical perspectives and practises interacted with their attitudes about digital technology and young children. Accordingly, it was suggested by Edwards et al. (2020) and VidalHall, Flewitt, and Wyse (2020) that certain teachers' perceptions of digital technology were impacted by their pedagogical principles of child-initiated play, which influenced their decisions about integrating digital technology into ECEC. However, it has also been suggested that professional development, conversations, and critical reflections, are

required in order to allow development to happen when implementing technology (Johnston, Hadley, and Waniganayake, 2020; Vidal-Hall, Flewitt, and Wyse, 2020).

The growing interest in and concern about young children's involvement with technology is a source of fascination and anxiety, as technology is able to have both a positive and negative impact on children. For more than a decade, debates concerning the benefits and drawbacks of digital technology in children's lives have dominated discourse, both anecdotally and via scientific investigations. In recent years, as a result of COVID-19's effect and the resultant changes in the way society operates, there has been an increase in worry over children's use of digital technology. Touchscreen technology has garnered considerable interest as a technique of retaining children's attention while also delivering amusement. Some of these adjustments are considered to have persisted into a new normal as the world adjusts to life following the outbreak. Prior to the adoption of COVID-19, young children's screen time consumption rose as a result of the increasing accessibility of Internet-connected touch-screen mobile devices. As Lowrie and Larkin (2020) note, the ease with which young children can interact with touchscreen devices has resulted in increased levels of engagement and a broader range of digital play alternatives. According to Danby et al. (2018), babies routinely interact with apps and touchscreen devices, and the Australian eSafety Commissioner (Australian eSafety Commissioner, 2021) recently stated that 94% of Australian children are online by the time they reach the age of four.

Concerns have been expressed about the content that young children can access via online viewing platforms and gaming applications. As Nansen, Chakraborty, MacDougall, and Vetere (2012) have asserted that the majority of technology is unregulated spaces. Advertising has grown in popularity in recent years, with many YouTube videos and games containing branded merchandise and content from commercial organisations. The Australian Communication and Media Authority acknowledges that advertising can have a detrimental influence on children's

development, and it is regulated by the 1992 Broadcasting Services Act and the 2009 Children's Television Standards. On the other hand, current standards and legislation do not apply to advertising that appears on the internet, which is significant (as opposed to those on broadcast television). In the United States, for example, there is no need for advertising content to be appropriately segregated from gaming or online viewing content (Danby et al., 2018). Cecchinato and colleagues (2019) highlight the capacity of digital content to maintain an audience's attention in their research on digital wellness for adults. Additionally, cases of children choosing screen interaction above other activities or being unable to disconnect from their touchscreen devices have appeared, raising concerns about the safety of children's screen-based media consumption (Smith and Brown, 2019). This is a contentious issue that is typically framed in terms of "digital addiction" and a lack of self-regulation. It is natural for young children to get so involved in their play that they are unable to disconnect quickly while they are having fun (Doyle, 2020; Göl-Güven, 2017). To gain a better understanding of children's interactions with technology, it is vital to determine whether the digital play is seen differently from more traditional forms of play and integrate such aspects in a way that benefits children's education.

2.10 Beliefs that Technology in the Classroom Increases Social Interaction and Cooperation Between Children

In the context of the current pandemic, mental health difficulties have become a major factor leading to a need for social support. Specifically, social support refers to an individual's subjective assessment of another person's capacity to supply material and psychological support, as well as general aid, during times of need (Eagle et al., 2019). Numerous studies have established that social support is critical for individual well-being in both non-epidemic and epidemic contexts (Leigh-Hunt et al., 2017; Siedlecki et al., 2014). Various studies have established a beneficial correlation between social support and mental health in terms of

positive affect, self-esteem, and adjustment following a bad occurrence (Grey and colleagues, 2020; Kaniasty, 2020). Furthermore, it has been argued that individuals may also benefit from social support by alleviating posttraumatic symptoms (Ozer et al., 2003; Jia et al., 2015) and promoting posttraumatic growth (Yu et al., 2014), for instance, by strengthening the individual's capacity to cope with imposed expectations. Indeed, several recent studies have demonstrated that increased levels of perceived social support mitigate the effect of spatial distancing mandates during the COVID-19 pandemic by reducing feelings of loneliness, depression, and post-traumatic stress disorder (PTSD), while simultaneously increasing a sense of belonging (Gabbiadini et al., 2020; Li et al., 2021). Accordingly, through the pandemic, the positive effects of technology on teachers have been suggested.

Individuals who have been confined to their houses were able to communicate online through technologies. Accordingly, sustaining social bonds facilitates the exchange of online social support among individuals who have been confined to their homes (Gabbiadini et al., 2020; Gilmour et al., 2020). Additionally, digital technologies enable individuals to offer and receive social help, which is especially advantageous for those who live alone. Online social support (henceforth referred to as "e-support") is crucial in the context of the COVID-19 epidemic because it is the primary kind of social support that many individuals have access to. As a result, it is an important aspect of cyberpsychology research (Guitton, 2020).

2.11 Beliefs that Technology Facilitates Educational Processes and Supports Children's Learning

Early childhood teachers have conflicting beliefs about the ability of technology to facilitate educational processes and support children's learning. For instance, Aldhafeeri, Palaiologou, & Folorunsho (2016) conducted a study investigating the beliefs of Kuwaiti early childhood teachers about the integration of technology in education. Most of the participating teachers (65%) believed that technology could not provide opportunities for children to learn.

About 57% of these teachers indicated that they would not consider the use of technology in the classroom.

In contrast, the majority of the research evaluated in this chapter found that many early childhood educators believe technology is advantageous since it streamlines instructional procedures while also promoting children's learning. For example, some educators believe that incorporating technology into play benefits children's learning in various ways. According to Nikolopoulou and Gialamas (2015), teachers support the use of technology in play because they think it provides possibilities for students to learn in a specific area, increasing their ICT competence.

Kara and Cagiltay (2017), meanwhile, describe the belief that technology enables students to succeed in a variety of areas. The researchers discovered that many teachers believe that technology has a beneficial influence on students' attention levels (Kara & Cagiltay, 2017). Additionally, Roach (2010) reveals that many teachers think that implementing technology into their instruction helps to enhance students' results. Yurt and Cevher-Kalburan (2011) discovered that the majority of teachers utilise computers to assist with everyday duties. Similarly, Marsh et al. (2005) found that the majority of early childhood educators included new technology in their curricula. This list of research highlighting positive beliefs can continue. Al-Awidi and Ismail (2014) found that teachers believe that technology may be used to improve a variety of instructional approaches that promote visual, aural, and kinaesthetic learning. Cox et al. (1999) discovered that teachers believe technology aids in the development of class presentations by offering relevant resources and that the Internet has facilitated the provision of teacher assistance online by allowing teachers to employ technology in the classroom.

According to Jonassen et al. (2008), technology is not a substitute for teachers but rather a collaborator in educational processes. As a result, students learn not from but through

technology, meaning it supports children's learning process by facilitating teaching. Pedagogical technology encompasses instructional designs and surroundings that are engaging for students through supporting their learning. Additionally, this application of technology promotes active learning approaches such as critical thinking and cognitive learning (Jonassen et al., 2008).

McKenzie, Spence, and Nicholas' (2018) research examined a tablet application for early childhood reading named 'A to Z Safari'. The referenced McKenzie et al. (2018) discovered that teachers had a favourable attitude about the usage of this application. According to their research, its usage with children increased the effectiveness of educational programmes by offering a novel mode of instruction that increases children's drive to learn and engage (McKenzie et al. 2018). Additionally, technology upholds the idea of equal opportunity for learning by adapting to children's unique demands (Sak, Erden, Sak, and Esmeray, 2016). Numerous computer programmes enable children of various ages and abilities to study. Various studies have shown that some teachers believe that technology offers a variety of activities that account for student diversity and give possibilities for children with varying degrees of aptitude to learn (Al-Awidi & Ismail, 2014; Kara & Cagiltay, 2017).

Some teachers think that a variety of tools, including YouTube, video games, and phonics songs, may be utilised to assist children in learning languages and that children can learn by viewing visuals and listening to clear sounds (Al-Awidi & Ismail, 2014; Sak, Erden, Sak, and Esmeray, 2016). Additionally, Clements and Sarama (2003) revealed that early childhood educators think that some software applications aid in children's language development. Teachers in other research have also acknowledged that they utilise technology to engage students in language learning activities by using applications such as letter-based games, such as those found in alphabet puzzles and alphabet songs (Al-Awidi & Ismail, 2014). Additionally, Kara and Cagiltay (2017) discovered that teachers believe in the advantages of

employing technology in storytelling and other language exercises. Numerous teachers include computers in musical activities and in the planning of literacy courses. The teachers' objective is to promote cognitive and language growth via the use of computers (Yurt & Cevher-Kalburan, 2011).

Likewise, Al-Awidi and Ismail (2014) emphasise that teachers think that utilising computers to teach children to read makes learning enjoyable. They think that technology also facilitates self-learning possibilities, as is the case when children may repeat and listen to tales on computers, allowing them to make connections between what they hear and read. Previous research also indicates that teachers think that technology aids children with task design and information appraisal in addition to facilitating literacy. Cicconi (2014), for example, points out that technology may be used to design assignments that assist students in analysing and evaluating knowledge in cooperation with peers.

The focus of teaching productivity research has ultimately been on student efficacy and on the use of constructive instructions. On lacking research, teachers relied upon the emotional conviction that their instruction affected children's learning (Kim et al., 2013). To put it another way, teachers subjectively affirmed their careers as teachers and believed they had a positive effect on children's literacy (Lu et al., 2010). Teaching effectiveness was measured by the perceived increased educational development of students and how effectively their learning objectives were met (Kim et al., 2013). According to Yang (2010), the viability of education is characterised by the capacity of teachers to schedule suitable teaching exercises, provide excellent training conditions, provide structured teaching content, use educational skills efficiently, and establish a harmonious teaching atmosphere during the teaching process. Lu et al. (2010) have argued that instructional collaboration, assessment, and school management, are crucial to help create a positive learning experience in order to increase enthusiasm and create a successful teaching atmosphere. Accordingly, the study examines

teachers' perceptions of implementing technology into classroom practices by conducting interviews with the teachers.

2.12 Beliefs about Technology and relationships Between Teachers, Students, and Parents

Many teachers also believe that the use of technology may help improve communication between teachers and students and between students and their classmates. When technology is used effectively in early education, it may help students learn as well as build connections (Al-Marroof et al., 2020). In support of this claim, Khoo et al. (2015) performed a study on younger children that examined the possibilities of using digital tablets in the classroom. It was observed that when young students were encouraged to try new and varied digital applications, they were more engaged and cooperative with their teachers and more driven to investigate the applications together. Accordingly, this led to changes in teacher beliefs about technology and accordingly, positive teacher-student connections are crucial in the classroom because they help students feel more secure, which in turn helps them learn more effectively (O'Connor, Dearing, & Collins, 2011).

A recurrent theme in the literature is that teachers lack the autonomy to incorporate technologies in the curriculum without difficulties (Brown, Jacobsen, & Lambert, 2014). While many teachers want and are motivated to ensure that their students are properly prepared for their futures, teachers question whether they themselves are capable of successfully using educational technologies as a way of improving their relationship with their students (Brown, Jacobsen, & Lambert, 2014). This can also be interpreted as anxiety of teachers who think they are not able to educate their students about their digital footprint, anonymity, or cyberbullying. Furthermore, teachers may also feel unsafe when contacting parents through the use of technology as they may not be aware of the anonymity it provides (Al-Marroof et al., 2020). The fear and loss of autonomy in this field prohibit many teachers from using educational

technologies (Brown et al., 2014). Otherwise, self-confident teachers remain unsure if students will use technologies per their instruction as it may hinder the student-teacher relationship. At times, educational managers are often more concerned with handling technical responsibilities (broken computers, technical difficulties in the lessons, etc.) rather than being concerned about delivering professional education and access to technology to teachers and improving their relationship with their students through it. Some managers often lack good communication about how teachers and students may learn from technology, meaning that teachers sometimes see modern technology as an annoyance instead of as a requirement (Kent & Giles, 2017).

In summary, research findings indicate that teachers have a favourable outlook on technology integration for a variety of reasons, as detailed in this section. Some of these studies include beliefs about technology's ability to 1) increase social interaction and help in promoting cooperation between children; 2) facilitate educational processes and support children's learning; and 3) improve relationships between the teachers, their students, and parents. However, there is, as discussed, a gap in the literature where it is the most important to begin implementing technology, especially in a Saudi Arabian setting.

2.13 Teachers' Negative Beliefs about Using Technology

In most developed countries of the Global North, technology is an integral part of teachers' pedagogical repertoire, as it is considered appropriate in educational settings due to its benefits (such as efficiency) for students. The use of digital gadgets, tablets, and smartboards in ECE has the potential to expand teachers' lesson plans and support the development of technical skills necessary for later life only if implemented correctly (Ajzen & Fishbein, 2005; Richardson, 2003). However, human ideas and behaviours are always changing, and introducing new teaching methods raises difficulties in an ever-changing environment. Some educators are opposed to innovations because they affect their standing and established methods (Blackwell et al., 2015; Mertala, 2016). Another reason for resistance to the

introduction of new technologies in the classroom is anxiety over technical failures related to the use of information and communication technology (ICT) devices, which might degrade the quality of instruction (Blackwell et al., 2015; Mertala, 2016).

When it comes to using technology in the classroom, teachers' personal values play a significant role (Hsin, Li, & Tsai, 2014; Nikolopoulou & Gialamas, 2015; Palak & Walls, 2009). Levin and Wadmany (2006) report that 'teachers' technology beliefs and classroom practices are multivariate and interrelated' (p. 157). In order to justify their anti-technology views, teachers may refer to perceived health risks to children, perceived linkages to child violence and poor behaviour, and perceived links to child abuse. These beliefs shall be promptly discussed.

Teachers in Saudi Arabia are reluctant to use technology for education, due to (a) a lack of the technology necessary in education, due to overcrowding of classes, (b) limited access to technology for the benefit of teachers, (c) a lack of experience for certain teachers because they have not been trained in technology use, and (d) a general belief that there is no technical support in Saudi Arabia (Al Mulhim, 2014; Alasimi, 2018). In Saudi Arabia, the improvement and promotion of teachers' performance and their training have been initiated by providing teachers with the essential skills, experience, and information (Al Mulhim, 2014; Alasimi, 2018).

According to earlier research (e.g., Konca, Ozel, & Zelyurt, 2016; Alasimi, 2018; Chordia et al., 2019), some early childhood teachers have a favourable attitude toward technology usage in the classroom, while others have a negative view. Thus, it is important for further research to interrogate these attitudes and the associated factors in more depth as they contribute to the explanation of teachers' behaviour with regard to physical teaching aids (Ajzen & Fishbein, 2005). According to Kagan (1992), teachers' ideas seem to be central to their pedagogical practises and are often related to conventional teaching styles. Any changes in

teaching techniques necessitated by technology integration must consequently be matched by changes in teachers' beliefs.

2.14 Beliefs about Negative Health Impacts

While many teachers agree that technology in schools provides chances for education and skill development, some also believe that technology has a negative impact on the health of particularly susceptible groups, such as children. According to Kara and Cagiltay (2017), some kindergarten teachers consider that technology might be harmful to children's health. Alghamdi (2016) argues that introducing technology to children—particularly in early schooling—has the potential to have a detrimental influence on a variety of facets of their life.

Regardless, many children at school and at home are growing up surrounded by digital technology, which may sometimes reduce their social contacts in person, thereby believed to negatively influence their behaviour. At the school level, it has been reported that teachers believe technology endangers children's health, social skills, and emotional development (Plowman & McPake, 2013; Wolfe & Flewitt, 2010). According to Plowman and McPake (2013), previous research has argued that computer and television use should be restricted for children for extended periods of time due to the negative health implications. However, the study conducted by Plowman and McPake (2013) did not find evidence of any negative health implications.

According to Wolfe and Flewitt's (2010) research, some teachers are scared to employ technology because they fear it may hurt students by reducing their engagement in activities. The research also found that other teachers believe that, although modest use of technology may be beneficial in general, it is nonetheless detrimental since it cuts into family time and causes students to spend more time alone and interact less with their families (Wolfe & Flewitt, 2010).

According to Ventouris, A., Panourgia, C., & Hodge, S. (2021), the majority of teachers believed that excessive use of technology would have negative psychological consequences for students, including the onset of anxiety. However, the quoted author recommends that, although technology may have negative health consequences. Similarly, Strasburger et al. (2010) have argued that teachers should be made aware of the prosocial impacts of technology in order to influence their views, which would result in an increase in technological effectiveness. Nonetheless, teachers' perceptions that technology might negatively impact children's well-being are well supported, as many researchers have pointed out that technologies can result in bad behaviours such as a lack of socialisation (According to Ventouris et al., 2021, Livingstone, 2016). However, as Livingstone (2016) points out, although growing access to technology raises associated dangers, the difficulties that children face today are not all Internet-related. As such, while recognising the benefits of technology on education, it may also be necessary to develop special methods to counteract detrimental consequences.

2.15 Beliefs that Technology Increases Violence and Bad Behaviour

Some teachers believe that technology is not suitable for children in school because technology leads to addiction, isolation, and introversion (Jaradat et al., 2020; Baturay and Toker, 2019). However, these fears need to be supported with evidence from psychologists or medical practitioners.

Vaughn, B. E., Santos, A. J., Monteiro, L., Shin, N., Daniel, J. R., Krzysik, L., & Pinto, A. (2016) assert that some important aspects are required for a child's healthy development such as contact and social engagement (i.e., social interactions). Teachers that are opposed to the use of technology in schools feel that it may have a detrimental effect on the development of young students, resulting in greater aggressiveness, anxiousness, and poor behaviour (Ventouris et al., 2021). Sugarman and Willoughby's (2013) study corroborates this assumption in their attempt to confirm the association between technology and aggression in

humans. Accordingly, their study argued that the internet poses different challenges in terms of violence and may be altering violent behaviour. Similarly, Strasburger, Jordan, and Donnerstein (2011) suggest that technology usage is associated with negative outcomes such as violence, aggression, drug misuse, developmental issues, obesity, and mood and psychological disorders.

Strasburger et al. (2010) also recognise an association between child and adolescent technology usage and increasing violence and aggressiveness in their findings. Violent and aggressive behaviour becomes acceptable to younger folks as a result of technology's glamorisation of violent behaviour via video games and other types of interactive media. According to Plowman and McPake (2013), significant worry exists regarding how exposure to violent material through digital technology may have a detrimental effect on an individual's psychological well-being and may cause developmental difficulties in children. However, the quoted authors indicate that no particular proof supporting this assertion about the use of digital tools to educate children has been discovered.

Most parents and teachers ensure children spend time doing various activities in moderation as opposed to having overexposure to one activity. Children—especially those between the ages of three and four—experience limited exposure to digital technologies since, at this age, children also have other interests such as 'dressing up, playing with toys, running around outside, or drawing and painting' (Plowman & McPake, 2013, p. 33).

With this multitude of research in mind, aggression and anxiety in children may be a result of uncontrolled exposure to technology to some level (Plowman & McPake, 2013; Rowan, 2013; Strasburger et al., 2010). Kardefelt-Winther, Rees, and Livingstone (2020) claim that it is yet unknown whether the Internet has a detrimental influence on children's mental health. However, the research suggests that children are unable to distinguish between violent media and material viewed on the Internet or television and real life, which might also lead to

young children being more violent and aggressive (Mustafaoğlu et al., 2018). Sugarman and Willoughby (2013) make a similar point, stating that technological aspects change the nature of bullying. However, Antonacci et al. (2008) have stated that limited technology use (and the limitation of access to undesirable information) may have the reverse impact and instead boost socialisation by promoting platform interaction.

2.16 Beliefs about Technology and Child Abuse

While technology is necessary for reaching informative and constructional objectives, some teachers argue that technology fosters child abuse by exposing children to cyberbullying (Eden, S., Heiman, T., & Olenik-Shemesh, D., 2013). In this context, child abuse does not always relate to physical injury. Child Matters (2014) defines child abuse as ‘any injury to a child or young person, whether physical, emotional, sexual, ill-treatment, abuse, neglect, or deprivation’ (p. 16). With the advancement of technology and the proliferation of Internet-connected devices, child abuse has taken on a variety of forms, including cyberbullying and child pornography (Balfe et al., 2015).

The United Nations Office on Drugs and Crime (UNODC) lists several types of child abuse that are assisted by technology, including cyber inducement, cyber harassment, cyberstalking, exposure to hazardous material, and online grooming, in addition to the aforementioned cyberbullying (UNODC, 2015). Amanda Todd’s tale is an example of children being subjected to cyberbullying. She was a victim of online bullying, which contributed to her death in 2012, generating outrage worldwide (British Broadcasting Corporation, 2016). This occurrence convinced many people that children should be prohibited from using computers and that Amanda Todd’s death has continued to influence attitudes about children’s digital usage.

Teachers and caregivers cannot monitor digital platforms on a casual basis, which raises the possibility of children being exploited and sexually abused through technology (Child

Matters, 2014). Gallagher (2016), on the other hand, believes that new technology now exists to monitor the Internet activities of convicted felons, therefore protecting children who utilise digital platforms for learning.

The evidence reviewed in this section demonstrates that teachers' unfavourable attitudes about technology are unavoidable. Teachers who are opposed to the use of technology in early childhood classrooms do so for a variety of reasons, including the perception of and belief in negative health consequences, the possibility that technology may contribute to increased violence and bad behaviour among children, and the possibility that technology may facilitate certain instances of child abuse (Child Matters, 2014). The subsequent section discusses some of the elements that may influence teachers' attitudes about technology integration in early childhood classroom education, whether favourable or negative.

2.17 Factors Impacting on Early Childhood Teachers' Beliefs

According to Blackwell et al. (2013), despite the growing availability of technology, it is frequently underutilised in education, particularly among children up to the age of four, since teachers do not consider technology to be effective at these ages. Several elements influence the integration of information technology into education, the most crucial of which is teachers' opinions (Blackwell, Lauricella, & Wartella, 2014; Blackwell et al., 2013; Nikolopoulou & Gialamas, 2015). Numerous factors affect these attitudes, including teachers' abilities, as well as the experiences and challenges associated with the use of technology in education.

2.18 Teachers' Competencies

Teachers have an obligation to assist students in acquiring skills in an educational context. Thus, teachers who educate children must possess a high level of expertise. According to Blackwell et al. (2014) and Levin & Wadmany (2006), when teachers lack ICT abilities, they

develop reservations regarding technology's role in education and the integration of computers and teaching.

Teachers with greater levels of technical expertise and confidence in their capacity to integrate technology successfully into their classes, on the other hand, advocate the use of technology in schools (Klein et al., 2019). These educators often assume they are capable of mitigating any negative consequences of ICT integration in education (Nikolopoulou & Gialamas, 2015). According to Ruggiero and Mong (2015), teachers must have a working knowledge of technology in order to properly provide education to students. Yurt and Cevher-Kalburan (2011) claim similarly that teachers' understanding of pedagogical strategies is a necessary component of successful ICT integration into children's education.

2.19 Teachers' Experiences

Individual experiences as a student and later as a teacher are likely to influence one's teaching beliefs (Albion & Ertmer, 2001; Keys, 2007; Tondeur et al., 2017). Mansour (2008) identifies two types of teachers' experiences: formal and informal. Formal experience is acquired by teachers during their education in school or university, as well as from training during in-service programmes. Informal experience is acquired by teachers through daily communication with others.

Teachers who are not familiar with technology may fail to see the advantages of incorporating it into the classroom. The inability of teachers and students to utilise ICT in the classroom due to a lack of knowledge and expertise is a major roadblock to the widespread use of technology in education (Awalt, Lawler, & Blake, 2012). A lack of exposure to technology may also lead teachers to form irrational, unsupported assumptions about the benefits of incorporating ICT into the classroom.

Teachers' worries regarding the use of technology in ECE are supported by scientific evidence, as described above. However, in cases of a lack of experience, some people hold

ideas that are based on inaccurate knowledge and misinformation. Regarding such inaccuracies, according to Plowman and McPake (2013), there is no evidence to support the views that: children and technology should not be mixed, and children are better at understanding technology than adults are.

There is a dearth of empirical data and ICT experience, according to the authors, which leads to the creation of these assumptions as myths. Plowman and McPake (2013) advocate for educators to obtain more expertise with technology so that they may understand more about children's interactions with digital technologies before developing assumptions that may restrict teachers from using technology in the classroom.

2.20 Barriers and Facilitators Teachers Face when using Technology

Typically, when examining barriers in the classroom setting, Ertmer's model that addresses both first and second-order barriers to change is crucial as it splits all barriers to utilising technology in the classroom setting into two main categories (first- and second-order barriers) (Ertmer, 1999). In particular, first-order barriers tend to be external barriers, such as acquiring the technical skills to teach. Furthermore, second-order barriers tend to be the beliefs that cause teachers to be resistant to change. Similarly, this model has been adapted in the literature presented below to analyse the barriers that are faced when employing technology in the education sector, particularly at the kindergarten level. According to a study conducted by Orlando and Attard (2016), computer shortages or lack of funds might be considered material hurdles (first-order barriers), whereas cultural barriers include phenomena like prevailing educational procedures and individuals' ideas about technology (second-order barriers).

When it comes to engaging students with technology, some teachers lack the ability to do so (Ruggiero & Mong, 2015, p. 163). Mishra et al. (2020) found that most educational institutions have failed to incorporate technology into the learning curriculum until recently. Other obstacles include inadequate technologies (e.g., computers), lack of maintenance and

training, insufficient telecommunication infrastructure, and information overload among teachers. These are only some of the issues identified in the referenced research. This means that the absence of technology in most public schools might be linked to a lack of the financial and human resources required to effectively manage ICT. Furthermore, teacher training programmes tend to lack courses that properly train teachers to incorporate technology into the classroom (Kent & Giles, 2017). This causes a void in teacher participation because student teachers do not bring the skills and perspectives necessary to change today's classrooms using the smooth incorporation of teaching technologies (Moon & Kim, 2001; Kent & Giles, 2017).

As largely discussed in this paper, teachers have different beliefs about the integration of technology in their classrooms. Existing literature reveals that these beliefs may be directed by factors such as the teachers' competencies, their experiences with technology, as well as the barriers that they face while using technology in their classrooms. The effective integration of technology in early childhood classrooms would, therefore, necessitate new measures to address these issues.

2.21 Information and Communications Technology (ICT) Integration in Early Childhood Teaching

The implementation of ICT in education settings has demonstrated substantial achievements, particularly in terms of developing the infrastructure of the classroom environment and enhancing the ICT expertise of the teachers in the classroom environment (Liu & Pange, 2015). Yet, these developments cannot meet the high expectations for ICTs in education (Blackwell et al., 2014; Nader, 2006). Some research has gone as far as to suggest that even when teachers are proficient at ICT-oriented education and are ready to integrate them into their classrooms, many educators still do not frequently use ICTs in their normal teaching practices (Liu, Toki, & Page, 2014).

Education policy, which is in turn informed by scholarly research, can itself be either a barrier or a facilitator to the use of digital technologies in early childhood settings. Research on the use of technology in ECE has been ongoing for decades (Ihmeideh, 2009; Blackwell et al., 2014). A variety of academics have found that incorporating ICT into ECE is beneficial to children's learning and development. Language and literacy, algebra, inventiveness, problem-solving, identity, commitment, and cooperation, as well as positive learning habits, are all examples of gains from ICT incorporation (Ayoub & Ahmad, 2020; Papadakis & Kalogiannakis, 2019). On the other hand, some scholars advise against incorporating ICT into ECE, especially for very young children. Children's well-being, unsafe digital information, children's anonymity, and children's alienation from culture and the physical world are among the top concerns posed by these researchers (Ayoub & Ahmad, 2020). According to Siddiq and Grainger (2015), infants under the age of two should not be exposed to any screen time, and older children should not be exposed for more than two hours per day. However, as ICT has grown in popularity and technology has become more pervasive in the lives of young children, an increasing number of scholars have recognised that the current focus should be on integrating ICT appropriately and productively into ECE in order to enhance the learning process rather than detract from children's health and well-being (Nikolopoulou & Gialamas, 2013). Hence, a joint approach articulation was issued by the National Affiliation for Instruction of Young Children and the Early Learning and Children's Media Center (2010), which advised early childhood educators to 'intentionally' and 'actively' use emerging technologies and modern media. Similarly, other researchers have suggested that 'cautious, comprehensive and professional' early childhood educators should use ICT (Evangelopoulou, 2014). This is a positive way of minimising or eliminating possible threats of ICT integration in early childhood instruction while simultaneously maximising the benefits of ICT. From this

viewpoint, the opposing views of the discussed historical controversies seem to harmonise with this contemporary perspective.

Developing countries have been much slower to adopt ICTs in their education sectors when compared with developed nations (Liu et al., 2014). Historically, this preparation has been centred on fundamental, auxiliary, and higher-level instructions. The utilisation and consolidation of ICT in ECE have received less consideration from, for example, Saudi researchers. According to previous research, early childhood teachers use ICT infrequently and ineffectively, and they face many problems and challenges (Meng et al., 2013). Accordingly, it was found that this ineffective and infrequent use was mainly a result of the belief of teachers that teaching traditionally is superior to the use of technology.

Conditions that do not encourage ICT's inclusion in education include obstacles to ICT adoption in the education system (Alwani & Soomro, 2010). Analysts have identified an extended list of issues confronting educators in common education. Ertmer's model (1999), in this case, can be utilised to classify the barriers. Firstly, the First-order barriers include lack of equipment and software, the need for time, the need for financing, lack of human resources, inadequate internet access and the need for educator training (Hsu, 2016; Coklar & Yurdakul, 2017). Furthermore, the second-order barriers include willingness, faith in technology, expertise, teachers' attitudes, beliefs, and lack of knowledge and skills (Hsu, 2016; Shannon & Wolf, 2016).

This Ertme model has been cited by many academics (Lin, Huang, & Chen, 2014; Goktas et al., 2013). In prior literature, a large number of unique obstacles were identified from a more detailed point of view. Second-order obstacles, to elaborate, are reflected by teachers' readiness to implement technologies and their current common practices (Lin, Huang, & Chen, 2014), as well as teachers' beliefs (Bingimlas, 2009), teachers' need for involvement and

technological aptitude (Bingimlas, 2009), and teachers' own quality of education and their propensities (Schoepp, 2005; Nuttall et al., 2019).

The failure of administrative assistance is thus another common cause why teachers do not consistently try to implement technology (Kent & Giles, 2017). Barriers to ICT integration in instructing have been studied primarily in elementary, secondary, and higher-level education. In the early childhood context (Ihmeideh, 2009; Nikolopoulou & Gialamas, 2013), scarce research has been carried out; however, the obstacles that can be identified in early childhood settings are comparable to those that may be encountered in other educational settings (Kent & Giles, 2017). Early childhood teachers confront both first-order and second-order challenges on a regular basis. For instance, they often face a lack of office space and assets (Sandberg, 2002), as well as the requirement for preparations (Turbill, 2001; Sandberg, 2002; Ihmeideh, 2009), insufficient time, and restricted classroom conditions regarding first-order bounds (Nikolopoulou & Gialamas, 2013). On the other hand, teachers' demeanours (Turbill, 2001), lack of information and capacities (Turbill, 2001), and a lack of confidence in educators in their capacity to implement technologies are examples of second-order impediments (Nikolopoulou & Gialamas, 2013).

2.22 Early childhood educator's Skills

In ECE, coaching interventions often entail a more experienced teacher offering continuing individual support to a novice or inexperienced teacher as they acquire and use specific skills to promote children's learning. In ECE, coaching interventions can take a variety of forms (Diamond and Powell, 2011; Landry et al., 2014; Artman-Meeker et al., 2015; Dunst, 2015). There is widespread consensus in the research that coaching is designed to improve children's learning by boosting classroom teaching practices (Diamond and Powell, 2011; Schachter, 2015). Furthermore, there is substantial variation between nations in terms of the

teaching methodologies and child outcomes targeted by coaching, the kind of coaching, and the amount of time spent giving coaching (Wasik et al., 2013; Schachter, 2015).

Early childhood educators attain many roles when caring for kindergarten-level children. Similar to any other professional, they need training and are required to specialise as they have a major role in motivating children and promoting them to learn in a safe learning environment that is able to develop their skills (for instance, social, linguistic amongst others). Similarly, Early childhood educators are also required to plan lessons suitable for children so that they are able to play and learn. They are also required to be able to learn effectively from meetings and be able to effectively teach based on feedback (Elek & Page, 2019).

It has been argued that teaching skills are directly correlated to the ability to utilise technology (Wang et al., 2011; Al-Qallaf & Al-Mutairi, 2016). Teachers have argued that multimodal reading and writing practices must be considered in education (Wake & Whittingham 2013). However, it has been suggested that teachers oftentimes cannot choose the right content available on the Internet and often lack a visual understanding of the technologies used by students (Wang et al., 2011; Al-Qallaf & Al-Mutairi, 2016). Al-qallaf and Al-mutairi (2016), after investigating the utilisation of blogs, PowerPoint, and the web by primary school children aged 11–12, found that educators still required technological aptitudes to assess insights, take notes, and incorporate substance via technology into their curricula. Brun and Hinostroza (2014) found that teachers utilise many computerised assets, primarily projectors and tablets, and via these technologies, teachers re-employ ‘traditional’ instructing and learning approaches. According to Sun et al. (2014), the question of how teachers engaged with students using technologies, i.e., providing guidance to students and answering questions, affected students’ comprehension of new ideas and facilitated more interactive inquiry. Teachers should

adopt child-centred, constructivist practices including project-based and problem-based learning (Tondeur et al., 2016) to shift away from conventional teaching and learning.

It has been suggested that the integration of ICT overturns teachers' routine educational habits and drives teachers towards potentially less-used educational styles, such as taking a constructivist approach to instruct, instruction, and organisation, by which teachers may carry out various tasks and organise technology-based practices based uniquely on the students' needs (Wake & Whittingham, 2013). It has also been suggested that the dissemination of technology in the sphere of education created entirely new methods of teaching rather than revolutionising traditional teaching methods (Orlando & Attard, 2016). At the primary school level, there is a differentiation between settled and portable innovations, such as the intuitive whiteboard (IWB) and tablets; while the former can be utilised for conventional teaching methods, the latter mandates a difference in teaching styles due to the technology's inherent versatility (Orlando & Attard, 2016). In addition, Anastasiades and Vitalaki (2011) find that teachers with experience tend to have more positive overviews of the use of technology and are able to make the most out of employing technology in classroom settings.

2.23 The Obstacles to Integrating Information and Communication Technology (ICT) in Preschool Education from teachers' Viewpoints

Khan, Hasan, and Clement (2012) noted that the quality and number of ICT presentations and integration into education in developed nations were significantly higher than in developing nations, which demonstrates that developing countries' integration of ICT into education is yet to be fully implemented. A few political, financial, and social components may play a noteworthy role in the coordination of the use of ICTs in education across nations (Ayoub & Ahmad, 2020). It may be claimed that the challenges to ICT integration experienced by educators at all levels of education change enormously from nation to nation, due not to the

light in which ICTs are presented both culturally and in an academic sense but rather due to the environment in which they are presented (Alwani & Soomro, 2010).

Some teachers may use ICTs to educate their students, but they are unable to implement acceptable and effective integration practices (Redecker, 2009). One of the main reasons for this is that teachers who want to include ICTs in their teaching practices face a number of obstacles that they are unable to overcome (Goktas & Baydas, 2013). Despite the views of a large number of educators and despite the importance of ICT, several obstacles persist. Goktas and Baydas (2013) have argued that from the viewpoint of teachers, the most substantial challenges tend to be first-order challenges, mainly failure to provide a foundation for the use of ICT; budgetary challenges and a lack of technical expertise and capabilities to use ICT. In addition, unique characteristics of preschool education mean that special government and stakeholder attention is paid to education, and the impact of lingering discussions among analysts on ICTs within the education of youthful children means that the matter is closely examined (Mueller et al., 2008).

The teachers in a kindergarten setting tend to confront a variety of obstacles in incorporating ICTs, most of which are similar to those in other education environments (Nikolopoulou & Gialamas, 2013). In consequence, it is important to study the difficulties that the teachers encounter in the incorporation of ICT from their viewpoint, particularly because researchers at the local and regional levels have paid little attention to this topic. Therefore, it is important to identify and learn how to overcome these hurdles, which in doing so will improve both the quantity and the quality of ICT integration among educators in their educational practice. Finally, in one particular case worth noting, researchers analysed the barriers to ICT integration in the Palestinian Childcare Centre in the Arab library, both in general and in the Arab library in particular (Ayoub and Ahmad, 2020).

2.24 Barriers to ICT

The need for innovative assets, the lack of developmental time, the need for specialised help, the need for authority, and the need for technological skills are all barriers to the successful integration of digital technology in educational settings and have been recognised by Martirosyan et al. (2017). Accordingly, Hechter and Vermette (2013) have carried out an Internet-based quantitative study of 430 educators and reported on boundaries to the implementation of technology in education. According to this study, one of the greatest reasons why teachers may not use technology as an instructional instrument may be a deficiency of specialised gear and assets, such as computers, tablets, and smart whiteboards (Liu et al. 2014; Nikolopoulou & Gialamas, 2013). However, other authors have argued that this does not show up to be a noteworthy obstruction to technology consideration within the classroom (e.g., Kurt, 2014). The need for competency in teachers—as well as the need for satisfactory preparation from educators to realise this requisite competency—are the key factors that impact the limited use of technology, according to global research carried out examining 26 nations (Kurt, 2014). ICT barriers are grouped into five areas, as outlined by Reid (2014); technological resources, processes, professorships, the environment, and administration. These shall be imminently discussed.

2.25 Technological Resources

Access to technological devices, technological robustness, and the complexity of utilisation are all variables that might hinder ICT execution. In this regard, educators are often disappointed with the slow bolstering of supplies of technology (Fenty & McKendry Anderson, 2014; Park, Dimitrov, Patterson, & Park, 2017). Inquiries in the USA have demonstrated that middle-income schools receive less technology than their higher-income counterparts (Hammond, Zieleski, & Goldman, 2014). This problem may at least be alleviated by the creation of technology support programmes directed at youths from lower-income backgrounds

(Blackwell et al., 2013). The need for this is emphasised by the aforementioned inquiries, which revealed that 80% of teachers said that technology was inaccessible and that around a quarter of those surveyed was blocked by the obstructions to viable technology integration in classrooms (Blackwell et al., 2013; Hammond, Zieleski, & Goldman, 2014). The need for the creation of ICT classes, which requires arrangement and time (Delgado et al., 2015), has revealed itself elsewhere to be a barrier. Moreover, planning time to use computer labs or to bring and orchestrate technological gadgets, in turn, requires more time, giving teachers the impression that technology integration requires considerable exertions of time and resources (Reid, 2014). Complexity also affects the use of technology by teachers. Many ICT gadgets are fast-growing and are being continuously upgraded, causing teachers to be puzzled when it comes to implementation efficiency.

2.26 Processes and Administration

Both technical and professional development services are provided during the ICT adoption process (Fenty & McKendry Anderson, 2014). According to Delgado, Wardlow, McKnight, and O'Malley (2015), teachers often lack several things required in ICT implementation, including peer assistance, technical aid, administrative support, troubleshooting aid, and non-teacher needs assistance. Moreover, an inefficient vocational development programme is a major obstacle to the use of ICT as it does not allow the process of implementing technology to be effective.

A strong vision for how technology and education may work together can help teachers use ICT more effectively (Claro et al., 2017). When it comes to technology integration, the convergence of thoughts between teachers and educational pioneers may well be a genuine challenge (Claro et al., 2017). Many decisions about technology are habitually made by school leadership without the input of educators (Reid, 2014). Claro, Nussbaum, Lopez, and Contardo (2017) investigated how new technology is often adopted in a contradictory manner; educators,

the authors reported, are often not given adequate technical aid or preparation time. In other works, school principals, on the other hand, have argued that sufficient technical support and preparation were available to teachers (Plumb & Kautz, 2015). Mixed-method research carried out on 19 early childhood teachers revealed that, in particular, a lack of time was a serious hurdle to the integration of teaching technology (Fenty & McKendry Anderson, 2014). Plumb and Kautz (2015) have also found that the absence of effective support by administrators was a critical impediment in their analysis of obstacles to technology integration in early childhood settings. The perspectives, efficiency, and attitudes of teachers, for example, directly impact the process of integrating technology into educational techniques (Belbase, 2015). Various studies of educators' viewpoints on technological integration have revealed that teachers perform better when using such technology (Blackwell, 2013). Methods of change are directly influenced by teachers' views about teaching and learning (Kim et al., 2013). The use of ICT in the classroom necessitates addressing teachers' beliefs and attitudes in order to transform schools and create supportive learning environments (Claro et al., 2017; Plumb & Kautz, 2015).

2.27 Environment

Changes in educational materials and instructional methods have occurred as a consequence of the fast growth of technology (Plumb & Kautz, 2015). The conventional educational system entails teaching and learning, with the teacher serving as the primary knowledge source (Blackwell, 2013). Educators have been compelled, however, to modify various instructional strategies as a result of the emergence of digital resources, allowing autonomous students to create their own forms of competence (Claro et al., 2017). According to the findings of a study of 49 New Zealand teachers done by Turnbull and Sullivan (2013), supplying teachers with updated and upgraded technological tools prompted teachers to adopt alternative instructional techniques to promote teaching and student learning. Quality technology equipment connected to teachers' curriculum, according to the study, might

improve teachers' pedagogical practices. According to the results of Sullivan and Turnbull (2013), teachers who continuously dedicated their time to technology increased their knowledge-base and pedagogic know-how on technology-based education. Every organisational transformation has a broad spectrum of interface, beliefs, and conclusions that all affect and alter preparation (Claro et al., 2017). According to Reid (2014), teachers need to know how to utilise technology in their classrooms in order to improve their own teaching methods (Plumb & Kautz, 2015). Also, according to Coklar and Urdakul (2017), teachers argue that they could not integrate technology correctly due to their lack of training.

2.28 The Influence of Teachers' Beliefs and Attitudes

Teachers' use of technology is hampered by a lack of training opportunities, yet these outside obstructions do not give a whole picture (Plumb & Kautz, 2015). In a mixed-method examination conducted involving 152 teachers within the United States, Hsu (2016) found that educator states of mind regarding technology are comprised of three parts: instructional method, the conviction of self-efficacy, and viewpoints on the utilisation of technology. According to the researchers, educators who have constructivist academic approaches to technology have a positive vision of the utilisation of technology. From a constructivist viewpoint, students produce knowledge through intuitively learning about situations. Educators employing a constructivist approach will offer assistance via collaborating with students and participating in learning scenarios (Parette, Blum, & Quesenberry, 2013). A study on teachers of children aged 8–11 carried out by Pittmann and Gaines (2015) in the district of Florida, USA, showed that constructionist-minded teachers tend to implement technology into their education strategies more often in comparison to other teachers. A survey of 75 participants found a substantial link between teachers' attitudes and perceptions of high-tech usage and teachers' use of it. Furthermore, as opposed to the information stored, teacher efficacy is a further factor resulting in successful teaching technology integration in the classroom (Hsu, 2016). Teachers'

own perceptions of their ability to carry out certain technology-related measures and to achieve desired outcomes may have a significant impact on their willingness to incorporate technology into their classrooms (Hart & Laher, 2015).

The views of teachers on the importance of technology for improving learning are another aspect that affects the use of technology by teachers. Teachers who respect technology are more likely to integrate technology into their courses (Buquoi et al., 2013). Teachers' personal thoughts about how technology might improve and promote student learning determine the degree of technology integration into classroom instruction. According to research by Kimmons and Hall (2016), educators admire digital gadgets which assist better learning, which in turn alters their views and ideas about technological integration.

A total of 153 teachers of children between the ages of 5–12 took part in a study by Lin, Huang, and Chen (2014); the study's poll indicated that teachers' views and values are influenced by how technology might make their jobs simpler and better. Similarly, a survey of teachers' thoughts and attitudes on integrating technology into education revealed that teacher behaviour is influenced by age and gender. Furthermore, teachers' confidence in their use of technology was influenced by their age, whereas gender affected their inspiration to spend time working on ICT.

Similarly, a mixed study in Kazakhstan examined the influence of teacher attitudes in relation to technology integration in the classroom, including self-assurance, knowledge, sex, and age. In another study, four elements—trust, expertise, gender, and age—were identified as being capable of affecting and changing teacher perspectives on technology (Mustafina, 2016). Teachers' opinions on the use of education methods were found to be favourable in research conducted in South Africa (Hart & Laher, 2015). The critical indicator of the teachers' judgments on technology was deemed useful and culturally relevant. The aforementioned study

found that, in order to succeed in integrating ICT in classrooms, teachers' perceptions of technology's usability and usefulness must be taken into account.

Access to ICT and the competence to utilise ICT is not sufficient for fruitful pedagogical integration; instead, the attitudes and beliefs of teachers play an important part in excellent practice integration (Hart & Laher, 2015). Another qualitative investigation on the viewpoints and attitudes of Iranian teachers towards technological integration showed that the attitudes of educators are vital for ICT integration (Rezaei & Meshkatian, 2017). The investigation depicts how teachers' conclusions towards utilising technology within the classroom are determined by the factors of the 'perceived ease of use' and 'perceived convenience' of technology. The teachers of the study most often indicated that technology-aided them in improving their teaching methods. Extrinsic factors such as technological accessibility, teacher training, and colleague attitudes, according to the study, influence both reported ease of use and perceived utility (Rezaei & Meshkatian, 2017).

The relevance of teachers' attitudes as a crucial component in adopting ICT was validated in another case study examining 35 distinctive schools in Spain, which inquired into the motivation for and want of teachers to use innovative apparatus (González-Sanmamed, Sangra, & Carril, 2017). The study looked into educators' views toward technology in four distinct school formats. Furthermore, a survey of 1,222 educators was performed to determine how the availability of electronic devices in classrooms affects teachers' perceptions of technology (González-Sanmamed, Sangra, & Carril, 2017). The study's findings revealed that the better-equipped the schools, the more positive teachers' views are. Another research carried out in three nations, the Czech Republic, Germany, and Norway, by the International Association for an Economic Assessment of Education Achievement, indicated that teachers had a substantial influence on the way in which they utilise technology in their classrooms (Eickelmann & Vennemann, 2017).

Another analytic study employing a random sample questionnaire recruited 260 teachers from 24 government elementary schools in South Central Botswana, South Africa (Ogwu & Ogwu, 2013). The majority of the teachers (77%) did not use technology due to a variety of difficulties, according to the findings. One of these roadblocks was a lack of and inadequate technological hardware. Poor training, insufficient assistance, a lack of professional teachers, large-scale classes, inadequate curriculum interpretation, and excessive curriculum requirements were further obstacles to using ICT.

According to the findings of these two research projects, the more schools with sufficient and effective technological assets, the more educators are propelled to use aid technology. Second-order boundaries (Hur, Shannon, & Wolf, 2016; Plumb, & Kautz, 2015), however, force one to consider new bits of knowledge, propositions, and arrangements regarding the characteristics of teachers and schools in order to encourage ICT integration. As a result, it is better to overhaul factors and strategies in such a way as to understand educators' states of mind regarding the use of technology in the advancement of students' learning (Blackwell et al., 2014).

2.29 Chapter Summary

Education, like other facets of life, is always changing as a result of technological advancements and other human discoveries. As a result, professionals must constantly adapt the educational system to meet new curricular needs. While some teachers have readily embraced the use of technology in ECE, other teachers do not agree with the prospect of integrating ICT into the classroom due to personal beliefs or fears. This chapter reviewed pertinent theoretical and research literature to explore the beliefs of educators regarding the use of technology with children, explore the factors influencing these beliefs, and highlight known barriers and facilitators that influence the implementation of technology in teaching with

children. As a result, the chapter presented a review of the literature that exists on the use of technology in a kindergarten setting.

Certain educators are understandably worried about the safety of young children if technology is incorporated into the classroom. Others, on the other hand, are aware of the benefits connected with the inclusion of ICT in curricula, such as the development of technical abilities. Technology allows education to be informational and instructive in nature which is required in order to satisfy the educational needs of children. Accordingly, it is well established in the literature that, if digital technologies are to be used effectively in educational settings, there is a need to tackle both first and second-order barriers, for instance, the attitudes and skills of educators and physical barriers such as making sure educators have access to suitable equipment.

This chapter has demonstrated that teachers' attitudes on technology integration in education differ significantly. In general, teachers who advocate for the use of technology may point to a plethora of benefits linked with the use of ICT in education. However, other research suggests that a sizable proportion of educators reject the use of technology in the classroom for a variety of reasons, including perceived negative impacts on children's health, the perceived promotion of developmental difficulties, and the perceived development of non-productive behaviours.

However, in an era when technology pervades human life, schools cannot avoid incorporating technology into learning if they are to fulfil the demands of their students. Additionally, experts have shown that incorporating technology into the classroom enhances collaboration and social engagement (Martin and Boliger, 2018; Lin et al., 2020). More significantly, technology has the potential to enhance educational procedures (Lin et al., 2020; Mourlam et al., 2019). As a result, the negative effects of technology must be addressed in

order to alleviate teachers' worries about technology usage in classrooms and to maximise the benefits of ICT on ECE.

Though a range of literature has been reviewed in this chapter, there are notable gaps in relation to the attitudes and experiences of early childhood educators in Saudi Arabia. The empirical study, which I will describe in Chapter 4, addresses these gaps.

The following chapter will discuss the theoretical model which is employed in this study.

3 Chapter Three: Theoretical Framework

3.1 Overview

This chapter discusses theoretical models for understanding educator attitudes to digital technology. The chapter also presents teachers' beliefs of teachers and the interrelationship of the differing viewpoints about their use of technologies in their classroom practice. This chapter describes two theoretical models that have been used to understand the belief systems of educators: the Technology Acceptance Model (TAM) and the Theory of Planned Behaviour (TPB). Finally, I discuss the theoretical model I employed in my own study.

3.2 Technology Acceptance Model (TAM)

The technology acceptance model is a prominent model to describe how users' perceptions of technology—the perceived utility and the perceived ease of use—affect their behavioural intentions (Hong et al., 2021; Dana et al., 2022). The idea that using new technology could increase users' job performance (Davis, 1989) is perceived as valuable, whereas an appreciation for the simplicity of use implies the belief that using modern technology is straightforward (Joo et al., 2018; Rad et al., 2022; Dana et al., 2022). Research has revealed that perceived ease of use has an indirect effect on perceived utility and the attitude towards technology through the mediation of utility (Davis, 1989). This suggests that the belief in user-friendliness (especially for younger children) can directly and indirectly alter attitudes (Casey et al., 2021). While the model for technology adoption in psychology and education has been widely confirmed and utilised, drawbacks of this model have also been noted. Considering that the model of technology adoption incorporates just two views about the technology itself, Joo et al. (2018) and Rad et al. (2022) have stated that the model excludes other significant external elements, such as the availability of resources and the opinion of peers. It may therefore be considered to fail to account for external elements such as potential societal issues relating

to the use of technology in kindergarten education. Furthermore, the perceived usefulness and ease of access to technology can differ in relation to the technology due to context (Cheon et al., 2012), as research using the technology acceptance model does not consider various important factors unique to certain settings (for example, voluntary settings and compulsory environments) (Benbasat & Barki, 2007). In research carried out in recent years, the technology acceptance model has been utilised in the ECE context as a way of adapting technology (especially in the context of COVID-19) (Casey et al., 2021; Hong et al., 2021).

Sanchez and Hueros (2010), for example, included the technical assistance variable in their technology acceptance model. Other studies also included the ease of access variable, measuring the use of assets such as technical aid, higher awareness of the classroom environment (Pynoo et al., 2011), and environmental factors (Chen, 2010).

3.3 Theory of Planned Behaviour (TPB)

The theory of planned behaviour (TPB) suggests that human behaviour is determined by behavioural intentions, which are in turn determined by three things: attitudes, subjective norms and perceived behavioural control (Scott et al., 2014; Ajzen, 1991). As a consequence, this hypothesis may be utilised to understand educators' intentions about the use of technology in the classroom. Three important components comprise the TPB: attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991; Carmack & Lewis-Moss, 2009; Lee et al., 2010). Ajzen (1991) defines attitudes as an individual's proclivity for assessing or favourably judging certain behaviours. On the other hand, subjective norms relate to the societal pressure imposed on an individual to do what they understand to be normal by abiding to accept behaviours in the society which they consider themselves as belonging to. Finally, perceived behavioural control depends on the perceived difficulty or accessibility of a task, and it is considered to reflect both previous experiences and anticipated challenges (Ajzen, 1991).

Boddington, King, and McWhirter (2014) have argued for the importance of people's attitudes and how they can enforce positive behaviours. Accordingly, each specific viewpoint can either positively or negatively influence the change; for instance, if a teacher agreed with the use of technology, it would be more likely that the implementation of technology has more positive effects and is made easier. The TPB suggests that attitudes are developed according to individuals' beliefs and values (Steyn & Graeme, 2011).

Numerous researchers have utilised the TPB to explain educators' motives and behaviours in the classroom, particularly in the information age. According to Czerniak et al. (1999), the TPB may be used to investigate how social science and scientific teachers link their ideas and goals. According to Knabe (2009), this idea has been effectively applied to educational technology research. Smarkola (2011) also suggests that the TPB may be used to explain classroom acceptance of technology since it is capable of elucidating the link between acceptance models and attitudes.

More relevant to the present study, Czerniak et al. (1999) investigated the link between the perceptions of kindergarten teachers from kindergarten through to twelfth grade about technology and their intent to use technology in their classroom instruction. According to the quoted authors, 'teachers' attitudes toward reform and their assessments of the existence of necessary support structures and/or hurdles to change are highly connected to their intents to execute these concepts' (p. 12).

The TPB has evolved as a result of adaptations of the theory of reasoned action, as well as innovation dissemination and social-cognitive theory (Bandura, 1982; Rogers, 1995). Other studies have included the TPB and developed their own model of technical explanation (Taylor & Todd, 1995). While empirical data has validated the TPB's applicability, certain unresolved problems have demanded special attention from different areas of the TPB. Ajzen (1991) emphasises the uncertainty about the precise nature of the interaction between each

theory component: attitude toward behaviour (AB), subjective norm (SN), and perceived behavioural control (PBC). He stressed that formulae for calculating expectation-value (i.e., multiplicative composites) are only partly effective at capturing these connections. In contrast, Hankins et al. (2000) stated that in statistical analysis, such as the use of multiple regressions, the operationalization of expectations and standards that are products that exist in terms of both values and expectations measures (i.e., multiplicative composites) should not be used. They submitted that while the expectancy-value measures could be related, the product of the two measures does not result in interaction between them. The method of separating expectation and value measurements by Eagly and Chaiken (1993) was proposed as proof of the usefulness of independent measures to demonstrate the modal identity of the TPB. In particular, Hankins et al. (2000) used particular questionnaire items to generate belief measures. A meta-analysis by Notani (1998) of 36 empirical studies testing the TPB supported the use of deconstruction, which is a major way to characterise various behaviours.

3.4 Deconstructed Theory of Planned Behaviour

In addition to the planned behaviour theory, the deconstructed behaviour theory combines both external and personal components (Figure 3.1) (Cheon et al., 2012). Kriek & Stols (2010) suggest that the user's attitude is classified by the idea of deconstructing behaviour into three indicators for beliefs on performance: perceived usefulness, compatibility, and perceived user-friendliness. Self-efficacy, facilitating technology, and facilitating resources are control beliefs that influence the behavioural control felt. The subjective norms (SN) are based on normative beliefs and can, for example, be influenced by colleagues and executives (Taylor & Todd, 1995). The deconstructed planned behaviour theory helps researchers to discern different external circumstances and personal beliefs in the decision-making process of teachers (Smarkola, 2008). In addition, the theory implies that there are not just a few beliefs that influence the purpose of using technology but also many backgrounds and interactions between

beliefs (Cheon et al., 2012). Furthermore, a variety of beliefs on the use of technology in the classroom might be found. Chien, Wu, and Hsu (2014) suggest that teachers' normative intentions are comparable to the deconstructed theory of planned behaviour's basic beliefs. The researchers also found that time, personnel support, infrastructure, and financial aid can be classified as variables facilitating the conditions of technology and resources which develop beliefs.

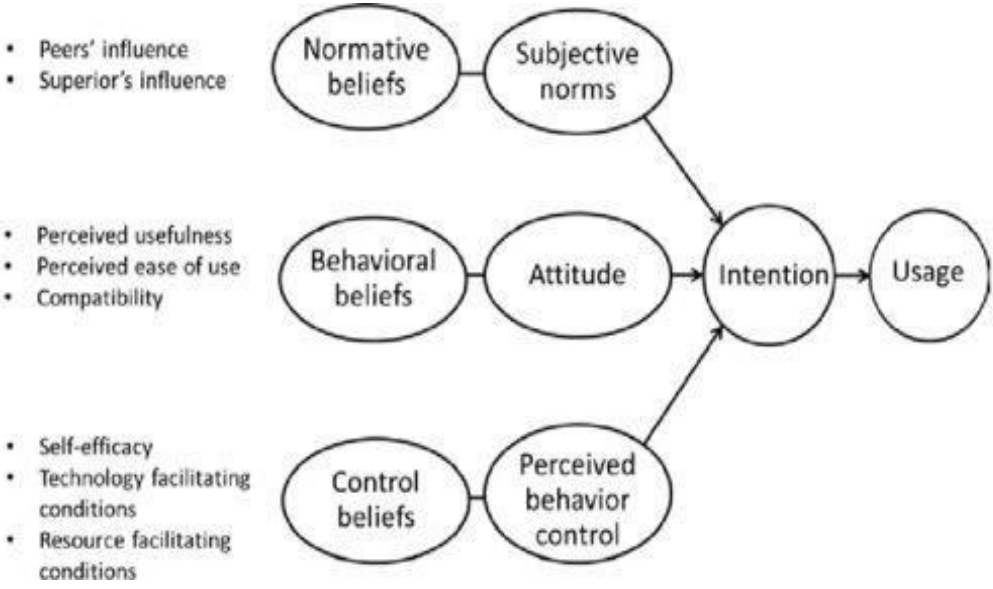


Figure 3-1- Deconstructed theory model in relation to planned behaviour (adapted from Cheon et al., 2012)

Ajzen and Fishbein (1980) and Ajzen (1991) have argued that the theory of planned behaviour (TPB) has been widely applied to comprehend and predict human behaviour in different settings. TPB posits that an individual's behaviour is influenced by three key elements: attitude, subjective norm, and perceived behavioural control (Ajzen, 1991). Attitude describes an individual's favourable or unfavourable appraisal of a behaviour, which is informed by their beliefs concerning the consequences of the behaviour and the value attached to such

consequences (Ajzen, 1991). According to Ajzen (1991), the concept of subjective norm revolves around an individual's perception of the social pressure to engage or avoid a particular behaviour, which is affected by the individual's beliefs about what significant others think about the behaviour and their drive to conform to these beliefs. Perceived behavioural control, as defined by Ajzen (1991), is an individual's assessment of the level of difficulty or ease of carrying out a particular behaviour. This assessment is based on the individual's perception of the presence of facilitators and barriers to the behaviour, as well as their perceived ability to overcome these factors.

These three elements play a crucial role in shaping human behaviour, as they impact an individual's inclination or resolve to carry out a behaviour (Ajzen, 1991). For instance, if an individual has a positive attitude towards a behaviour, perceives that important others think they should perform the behaviour, and feels that they have control over performing the behaviour, they are more likely to intend to perform that behaviour (Ajzen, 1991).

3.4.1 Attitude

The initial element of the TPB is the individual's attitude, which pertains to their favourable or unfavourable assessment of a particular behaviour. Attitude is influenced by beliefs about the outcomes of a behaviour and the value that is placed on these outcomes. In other words, when an individual perceives that a certain behaviour will result in beneficial consequences, their inclination towards that behaviour becomes more favourable. Similarly, if an individual values the outcomes associated with a behaviour, they are increasingly likely to have a positive attitude towards that behaviour.

Attitude is a significant component of the TPB, as it plays a crucial role in shaping an individual's intention to perform a particular behaviour. A person's attitude towards a behaviour can be a determining factor in their likelihood to engage in that behaviour. For instance, if an

individual holds a positive attitude towards exercising, they are more likely to intend to exercise regularly, as per the TPB framework.

3.4.2 Subjective Norm

The TPB's second component is subjective norm, which relates to the individual's perception of the societal pressure to engage or refrain from engaging in a behaviour. The belief regarding the thoughts of significant others about the behaviour and the drive to conform to those beliefs influence the subjective norm. In other words, if an individual believes that important others (such as family members) think that they should perform a behaviour, they are more likely to feel social pressure to do so. Similarly, if an individual is motivated to comply with these beliefs, they are more likely to feel performance pressure.

In the context of the TPB, subjective norm is important because it influences an individual's intention to perform a behaviour. An individual's intention to perform a behaviour can be influenced by their perception of the social pressure from important others to perform that behaviour (Ajzen, 1991). For example, if a person perceives that their spouse thinks they should exercise regularly, they are more likely to intend to do so.

3.4.3 Perceived Behavioural Control

According to Ajzen (1991), perceived behavioural control (PBC) is one of the components of the TPB, which involves an individual's perception of the ease or difficulty of performing a behaviour. The perceived presence of facilitators and barriers to the behaviour, as well as the perceived ability to overcome these facilitators and barriers, influence PBC. In other words, if an individual perceives that there are facilitators (such as resources, skills, or time) that make a behaviour easier to perform, they are more likely to feel that they have control over the behaviour. Similarly, if an individual perceives that there are barriers (such as lack of resources, skills, or time) that make a behaviour more difficult to perform, they are less likely

to feel that they have control over the behaviour. In the context of the TPB, PBC is important because it influences intention to perform a behaviour. If an individual perceives that they have control over a behaviour, they are more likely to intend to perform that behaviour. For example, if a person perceives that they have the necessary resources, skills, and time to exercise regularly, they are more likely to intend to do so (Armitage & Conner, 2001).

Concluding, the elements of the TPB, namely attitude, subjective norm, and perceived behavioural control, play a crucial role in determining human behaviour. By understanding these components, researchers and practitioners can design interventions and strategies that promote positive behaviours and prevent negative behaviours (Ajzen, 1991). For example, interventions can target an individual's attitudes towards a behaviour by providing information about the outcomes of the behaviour and highlighting the value of those outcomes. Interventions can also target subjective norm by highlighting the beliefs of important others and emphasizing the social pressure to perform the behaviour. Lastly, Ajzen (1991) suggests that interventions can address perceived behavioural control by offering resources and assistance to overcome obstacles to the behaviour and enhance an individual's perceived capability to perform the behaviour.

3.5 Employing TPB in understanding kindergarten teachers' attitudes about technology

The application of the theory of planned behaviour (TPB) has been widespread across different domains, including the field of education, since it is a firmly established theory in social psychology. In particular, the TPB has been used to understand and predict teachers' attitudes and behaviours related to the integration of technology in the classroom. In following paragraphs, I discuss each of the fields that utilise the TPB and link them to understanding kindergarten teachers' attitudes about technology in education and how such attitudes affect technology integration in the classroom.

In the field of education, the Theory of Planned Behaviour (TPB) has been used to understand teachers' attitudes and behaviours related to various educational practices, including technology integration. According to Ajzen (1991), the theory of planned behaviour (TPB) comprises three primary components: attitude, subjective norm, and perceived behavioural control (PBC). Attitude represents an individual's positive or negative assessment of a particular behaviour, while subjective norm reflects the perceived social influence on either engage or refrain from engaging in the behaviour. Perceived behavioural control (PBC) relates to the individual's perception of the ease or difficulty in performing the behaviour. In the context of technology integration in the classroom, attitude refers to a teacher's beliefs about the value and usefulness of technology in education, subjective norm reflects the social pressure from colleagues, parents, and administrators to use technology in the classroom, and PBC reflects a teacher's perceived ability to integrate technology into their teaching (Ertmer, Ottenbreit-Leftwich, & York, 2007). Understanding kindergarten teachers' attitudes about technology in education is crucial to predict their technology integration behaviour (Chen & Wu, 2015).

A study by Kalogiannakis and Papadakis, (2019) found that kindergarten teachers' attitudes towards technology in education were positively correlated with their intentions to integrate technology into their teaching. The study also found that perceived behavioural control was a significant predictor of technology integration behaviour among kindergarten teachers.

The TPB is based on the principles of social psychology, which emphasizes the importance of social influence on attitudes and behaviour. In the context of education, social influence can come from various sources, such as colleagues, parents, and administrators. Understanding the social influence on kindergarten teachers' attitudes about technology in education is essential to predict their technology integration behaviour. A study by

Nikolopoulou and Gialamas (2009), found that kindergarten teachers' social influence was positively correlated with their attitudes towards technology in education, which in turn predicted their technology integration behaviour. The TPB also incorporates sociological concepts, such as social norms and cultural beliefs. Understanding the cultural beliefs and norms that influence kindergarten teachers' attitudes about technology in education is crucial in order to predict their technology integration behaviour. For example, in some cultures, there may be a belief that technology is not appropriate for young children, which may influence kindergarten teachers' attitudes towards using technology in education. A study by Kusan et al. (2013) found that cultural beliefs were a significant predictor of kindergarten teachers' attitudes towards technology in education, which in turn predicted their technology integration behaviour.

In conclusion, the TPB has been applied in various fields, including education, to understand and predict attitudes and behaviours related to technology integration in the classroom. Kindergarten teachers' attitudes about technology in education can be influenced by social, psychological, and sociological factors. Understanding these factors is essential to predict their technology integration behaviour and develop effective strategies for promoting technology integration in kindergarten classrooms.

This study utilised the model of technology acceptance and the deconstruction of the planned behaviour model based on the aforementioned considerations and updated them both based on the prior qualitative investigation. This updating and dual-use resulted in a new model. As recommended by the technology adoption model, the new model follows the framework of the deconstructed planned behaviour theory, integrates internal and external components, and encompasses both direct and indirect repercussions of the perceived ease-of-use approach. It must be noted that teachers' sentiments concerning technology are the definition of attitudes in

this study. The comprehensive model utilised in this study is based on the Deconstructed theory model and was changed to be based on teachers' beliefs in and planned uses for technology (Figure 3.2).

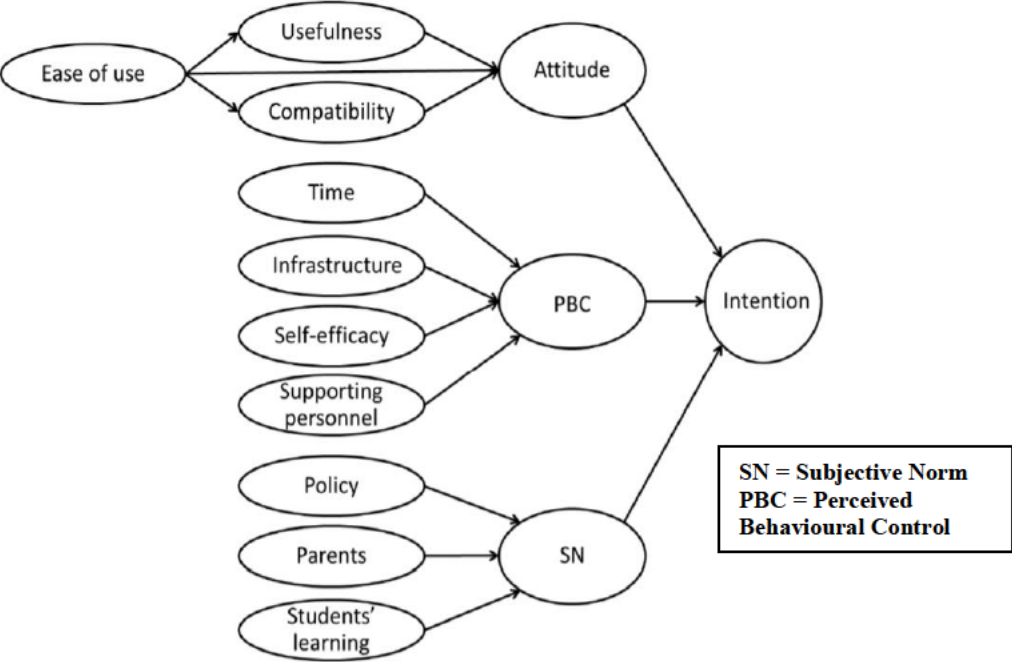


Figure 3-2 The model proposed in this study (adapted from: the Deconstructed theory model Cheon et al., 2012)

Currently, mixed or hybrid learning has naturally acquired significance in the context of the COVID-19 health crisis. Specifically, the term "hybrid learning" refers to a method of instruction that combines possibilities for online participation with the study of instructional materials that are accessed online, but through the use of traditional face-to-face methods of teaching in an online setting (Carr, 2021). However, in the context of this study, hybrid learning, as it was conducted before the COVID-19 pandemic, the concept of hybrid learning was not relevant as students were taught face to face in a kindergarten setting.

Accordingly, when the study was conducted, ordinary education had undergone progress in integrating electronic resources into the classroom rather than in an online setting. Regarding this, a way in which teachers may master three knowledge categories to properly integrate new technology into the classroom was established and was used as a basis for technology integration (Beschoner and Woodward, 2019). Teachers should, at first, according to the researchers' suggestions, become sufficiently aware of the subject they are teaching (content knowledge) and must then understand processes and practises of teaching and learning or technology-based methodologies (pedagogical knowledge and technological knowledge). In this way, satisfactory results can be accomplished by technology by merging these three different types of knowledge (Koehler & Mishra, 2009). Teachers with high technology, pedagogy, and content knowledge (TPACK) skills have been demonstrated to be effective at integrating new technologies into the classroom. We may thus establish a correlative relationship between TPACK and the technology acceptance model (TAM). Through the development of TPACK, new knowledge can be created about how technologies can be integrated into the kindergarten classroom.

Blackwell et al. (2011) have advocated how vital it is to know how to enhance teachers' views and promote technology integration through the educational use of new technology. Tezci (2011) stressed the need to grasp the variations in perception among teachers of various sexes and degrees of expertise through qualitative inquiry. Perception is a personal trait that changes and evolves over time; thus, its current condition at any given time needs to be identified. In technology's adoption and integration into classrooms, teachers' beliefs play a vital role.

To describe the collection of material that teachers require in order to properly educate their students and utilise technology, the "Technological Pedagogy Content Knowledge" (TPACK) theory was developed (McGraw-Hill, 2019). Specifically, this theory aims to

ascertain the form of knowledge required to incorporate technology into the classroom setting by allowing the understanding of dynamic, variable, and contextual factors of teacher knowledge. Similarly, this technique is based on Shulman's idea of Pedagogical Content Knowledge, which was initially introduced in 1986, as argued by Valtonen et al. (2020).

The TPACK framework (see Figure 3-3) allows teachers to view knowledge in a new way (Graham et al., 2012). Specifically, the TPACK framework matches content learning with content delivery in a way that addresses any problems that teachers frequently encounter when attempting to match current learning demands (Voogt & McKenney, 2017). Consequently, if teaching and learning professionals increase their TPACK, integrating technology into the classroom and learning process would become a more efficient process (Cheng and Xie, 2018).

TPACK is critical for kindergarten teachers, as they have a major impact on the next generation of students and teachers. Consequently, it has been argued by Voogt and McKenney (2017) that the proper implementation of TPACK in the classroom requires attention to ensure that classroom material is presented correctly. However, there is a lack of literature specific to the material teachers require in order to improve early literacy through the use of technology, and teacher educators themselves struggle to incorporate effective technology into their own classrooms (Voogt & McKenney, 2017). On the other hand, other studies have questioned the need for technology-based training (Kurt, 2018). Consequently, the purpose of the TPACK is to provide a time-tested instrument for assessing twenty-first-century skills, as defined by Voogt and McKenney (2017) in their study. With regards to the model itself, the four most important pillars are as follows:

1. Pedagogical knowledge (PK) relates to teaching strategies and procedures and involves, among other things, classroom assessment, management, lesson planning, along with student learning.

2. Technology knowledge (TK) includes the knowledge of a wide range of technologies, vary from low tools including pencil and paper to high technology (high-tech) devices such as computers.

3. Content Knowledge (CK) is expertise about the specific subject area to be taught or learned. Teachers must have sufficient knowledge on the subject to be able to teach students and ensure their best academic outcomes.

4. Pedagogical content knowledge (PCK) refers to a comprehension of the teaching process. It is unique for various subject areas to possess pedagogical content knowledge since it is a synthesis of content and pedagogy with the goal of enhancing teaching practices in the topic areas (See Figure 3.3).

One shortcoming of the TPACK framework is related to the domains and their interaction. Accordingly, as suggested by Doering, Veletsianos, Scharber, and Miller (2009), due to teacher's expertise being less significant than the information they employ, aspects like PK may be more relevant in a particular context than CK, meaning the whole TPACK model may require the importance of each aspect to be ranked.

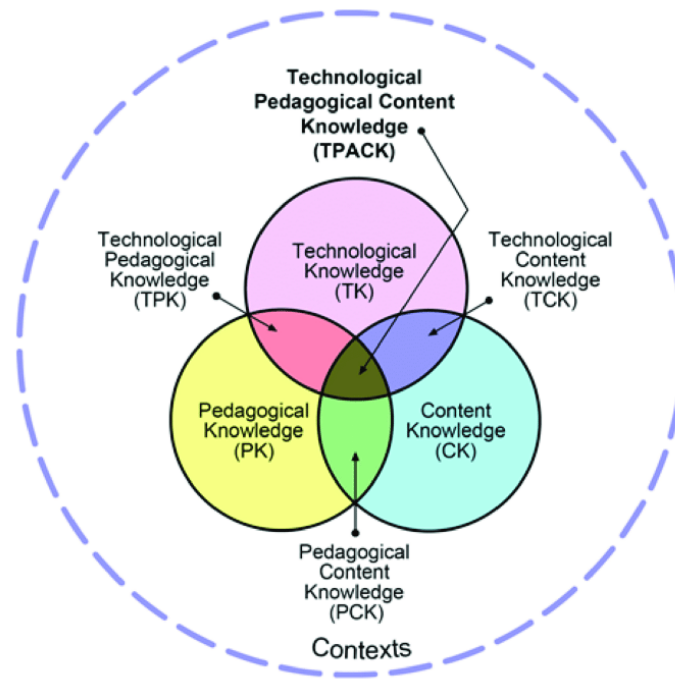


Figure 3-3 The technological pedagogical content knowledge (TPACK) framework
 (source: Koehler and Mishra, 2006)

Technology use refers to teachers' use of computers, the Internet, and other associated ICT that enables intra- and extra-connected computer information and knowledge as well as education software to be disseminated for educational and training purposes. Many technology research studies aim to identify the elements determining the adoption, acceptance, or use of certain technology by individuals. While some academics draw from other fields for a theoretical framework, others constructed new models to explain behaviours using technology.

3.6 Theoretical Framework

Ajzen's (1991) Theory of Planned Behaviour is used as the conceptual framework for analysing teachers' beliefs on their plans to include digital literacy in their classrooms. As seen in Figure 3.1, the TPB postulates that conduct depends on prominent behavioural beliefs that usually impact the intents of a person (Ajzen, 1991). Three types of beliefs are indirect cognitive assessments of intentions, including conduct, normative beliefs, and control beliefs.

3.6.1 Behavioural Beliefs

According to the Theory of Planned Behaviour (TPB), attitude is predicated on the belief that certain activities (for instance, teachers' utilisation of digital literacy) have their consequences (for example, children's arithmetic achievement). When assessing the outcomes, the personal opinions of teachers are considered. Accordingly, teachers would be able to embrace aspects such as digital literacy when they believe it will help them improve student learning outcomes or students' abilities to function in the twenty-first century. The TPB takes the assumption which states that specific behaviours (e.g., teacher integration of digital literacy) are linked to certain results or implications. Teachers' own judgements balance each result against their own efficacy. For instance, if teachers believe that integrating digital literacy would assist in enhancing students' learning outcomes or capacities in the current day, teachers are inclined to embrace it.

Teacher pedagogical principles have a critical impact on the choice to integrate ICT into the classroom. Teachers who adhere to either conventional or instructive (teacher-centred) educational attitudes tend to believe that there is a major focus on learning from the teacher as they provide detailed teaching. Consequently, the classroom usage of ICT is negatively associated with teachers that have constructivist views. When ICT is used in the classroom, it is limited to improving the conventional teaching methodologies. Accordingly, ICT can be integrated in a representational manner (Liu, 2011). However, it should be argued that while an instructive and constructivist approach can be utilised, teachers' beliefs are a multifaceted subject that sometimes contradicts one another (Mansour, 2009). Furthermore, Teo et al. (2008) have asserted that while there is a strong association between constructivist pedagogical concepts and constructivist technology usage, constructivist pedagogical views also have a connection with instructivist or conventional technology use in a sense as it ensures learning is adapted to students. Therefore, there are considered to be three characteristics of technology

use and integration that have been identified as perhaps explaining the discrepancies between teacher pedagogical concepts and practises. As a result, Chen (2008) classifies these aspects as follows: a lack of the influence of external factors (for instance, lack of planning time, lack of support amongst others), limited understanding of constructivist teaching and other aspects that cause conflicting teacher pedagogical beliefs.

3.6.2 Normative Beliefs

Subjective norms are founded on the normative concepts of social support and social pressure to behave in a particular way (for instance, those to integrate digital literacy in a classroom). Teachers' desire to follow what they consider to be influential people's prescriptions has an effect on their level of trust in this notion. Accordingly, Ajjan & Hartshorne (2008) has argued that it is likely that teachers' decisions to integrate digital literacy into their classes in an educational context would be influenced by the thoughts and ideas of others, such as colleagues (other teachers), school administrators, and students. For instance, the administration may advocate for the utilisation of technology when colleagues consider it would be too time-consuming. Specifically, normative beliefs have been shown in earlier studies to be a key factor affecting teachers' intentions to use technology in the classroom (Teo, 2009; Sang et al., 2010). The basis of normative perspectives on social support and social pressure must be based on subjective norms (e.g., to integrate digital literacy in a classroom). The degree to which this belief exists is determined by the teachers' desire to adhere to the perceived standards of other significant individuals.

Prior studies have identified normative beliefs as a crucial influence on teacher technology utilisation intentions (Ma, Anderson, & Streith, 2005). Individual teacher motivation and subjective norms are defined as the imagined expectation of how certain changes will impact their classroom environment. Similarly, subjective norms typically relate to an individual's or group's impression of how certain people behave (Sang et al., 2010).

Consequently, subjective norms are an individual's perception of societal pressure to engage in or abstain from certain behaviour. They are defined by Sadaf et al. (2012) as being the results of the influence of normative beliefs on the intents of teachers, which can impact their implementation of technology in the classroom. Similarly, in Sadaf et al.'s study (2012), it was revealed through data analysis that 38% of administrators' and 26% of staff believed that their expectations were able to influence their decisions to employ technology. Additionally, teachers claimed that their inclination to utilise these technologies was influenced by their parents (13%), as well as the general public and the media they consume (11%).

3.6.3 Control Beliefs

Perceived behavioural control assessments indicate that the more confidence teachers have in their talents and capacity to access resources, the greater their felt behavioural control will be. When assessing the relevance of control beliefs, the quantity of confidence is assessed, for instance, the courage to implement digital literacy within their specific classrooms. Accordingly, teachers who are self-assured and have access to resources are more inclined to adopt new technologies (Teo, 2009; Vahdati et al., 2015). Therefore, having control belief provides teachers with a sense of confidence, allowing them to effectively integrate digital literacy into their lessons. Control beliefs are able to offer a basis that measures behavioural control, suggesting that the more confidence and access to resources teachers have, the higher control they have. The level of control, which is how many teachers believe the monitoring facilitates or prevents the integration of digital literacy within their classrooms, takes into account the importance of control beliefs. Self-assured teachers are inclined to combine modern technologies and resources (Taylor & Todd, 2005; Ma, Anderson, & Streith, 2005). Fewer impediments can provide a sense of control and have a beneficial impact on the integration of digital literacy within the teaching in their classrooms.

The Theory of Planned Behaviour (TPB) began in 1980 as the theory of reasoned action to forecast an individual's desire to conduct said action at a certain point in time (see Figure 3.3). The hypothesis was designed to explain all behaviours that individuals can themselves control (Ajzen, 1991). The essential components of this paradigm are behavioural intent, the attitude that the conduct has the intended result, and the subjective assessment of the danger and benefit of this consequence; these influence individuals' behavioural intentions (Ma, Anderson, & Streith, 2005).

The TBP was used to predict and understand numerous health behaviours, such as smoking, drinking, using healthcare, breastfeeding, and drug use. According to the TPB, compartmental performance is contingent upon motivation (intention) and capability (behavioural control). It differentiates three forms of beliefs: conduct, norm belief, and control belief (Eagly & Chaiken, 1993). The TPB consists of six components that collectively influence the behaviour of a person. The first of these are attitudes that relate to the extent to which a person evaluates the activity of interest favourably or unfavourably. This involves taking into account the results of conduct (Lee et al., 2010). Furthermore, behavioural intent is linked to motivating elements affecting certain conduct, which determines one's likelihood to perform the activity. It also contains subjective standards referring to the belief in approving or disapproving of behaviour (Benbasat & Barki, 2007; Cheon et al., 2012). This concerns a person's beliefs as to whether he or she should participate in the behaviour of other people and individuals of importance. Social standards that pertain to the usual behavioural codes in a group of persons or a wider cultural environment also apply. Regarding this, individuals' social norms are viewed as normative or standard. This is similar in that it emphasises perceived power, which refers to the existence of conditions that might aid or hinder behaviour performance. Perceived power enables a person to exert control over his or her perceived behaviours (Benbasat & Barki, 2007; Cheon et al., 2012). Finally, behavioural control is

associated with an individual's perception of the difficulty of engaging in certain behaviour. Perceived behaviours fluctuate according to circumstance and behaviour, leaving an individual with many perspectives on behavioural control. (See Figure 3.4)

3.6.4 Teacher self-efficacy beliefs

Another critical concept is to examine teachers' self-efficacy, which is linked to ICT integration. Accordingly, self-belief is critical for human adaptability to change as it conveys self-confidence in the ability to take a sequence of actions as a way of accomplishing a particular goal, which motivates and influences people's behaviour (Sang et al., 2010). Consequently, Bandura (2000) suggested that one's self-efficacy is equivalent to an individual's ability to achieve. Similarly, it impacts positive or negative thinking in an individual; the amount of effort they devote to a particular endeavour, the expected outcomes of their efforts, and their resilience in the face of adversity are all elements to examine. In addition, a teacher is more likely to incorporate technology into the classroom if he or she possesses the confidence to put their abilities to work or has the confidence to learn a new skill to develop the classroom.

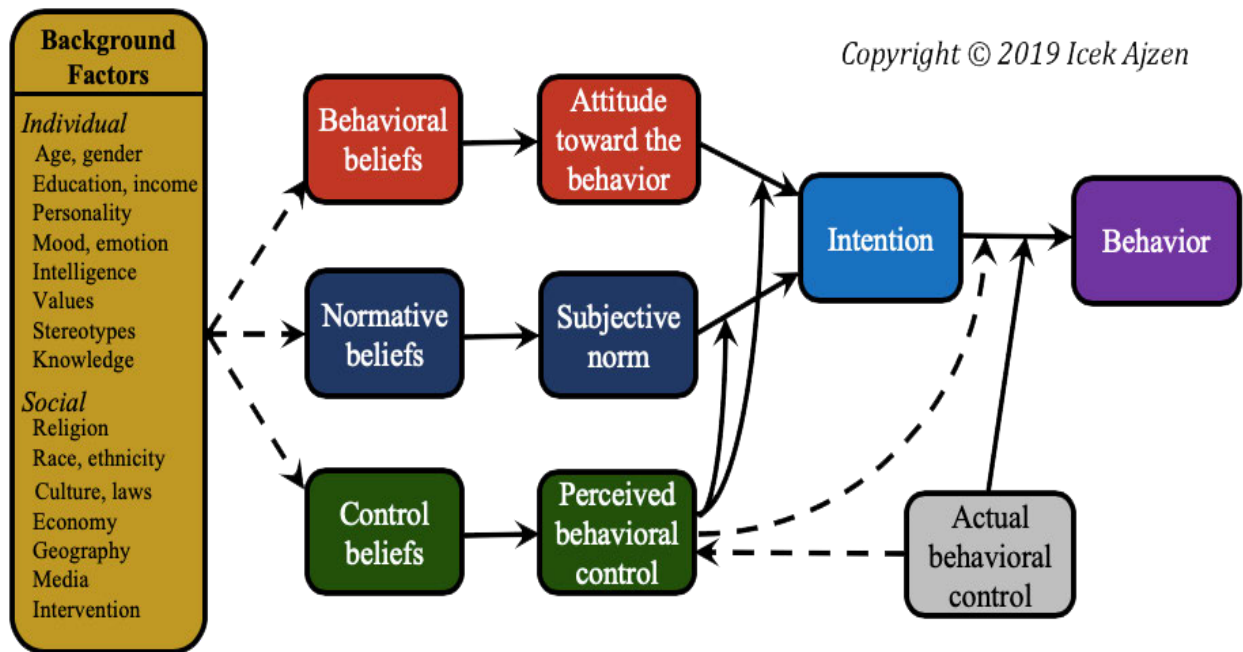


Figure 3-4 Theory of planned behaviour

3.7 Chapter conclusion

This chapter has discussed the theory for this study, specifically the Technology Acceptance Model (TAM) and the Theory of Planned Behaviour (TPB). The chapter also presents the beliefs of teachers and the interrelationship of the differing viewpoints of the beliefs and usage of the technologies of teachers. According to the Theory of Planned Behaviour (TPB) framework proposed by Ajzen (1991), behavioural beliefs depict beliefs related to specific consequences and outcomes, normative beliefs depict beliefs related to specific expectations held by someone, and control beliefs depict factors and opportunities to perform specific conditions. The information obtained from the semi-structured interview in this research reveals specific examinations of kindergarten teachers' perspectives about facilitators and obstacles while using technology in the classroom to educate children. In the next chapter, I discuss the strategy and the phases that were applied in this research method design.

4 Chapter Four: Methodology for the Qualitative Study

4.1 Introduction

The first three chapters of this thesis (namely, the introduction, literature review, and theoretical framework) have discussed and debated the existing knowledge that has been shown in literature on the topic at hand (understanding Saudi kindergarten teachers' beliefs and pedagogical practices with respect to the use of technology in order to improve children's learning and development). This has been done in order to address and solve the three following research questions that were formulated based on the justification of knowledge in the literature: "What are the beliefs of kindergarten teachers regarding the use of technology with children in Saudi Arabia?" "What are the factors influencing the beliefs of kindergarten teachers on the use of technology for educating children in Saudi Arabia?" "What are the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children from kindergarten teachers' perspectives in Saudi Arabia?"

Firstly, the current chapter presents an overview of the research strategy by explaining all the phases that were applied in this research method design, which starts with justifying all the components related to the philosophical paradigm. Subsequently, it discusses an in-depth justification of the selected qualitative (and inductive) research approach in the form of the case study research design, which is considered to be an appropriate methodology to address the three research questions and to meet the study's goals and objectives. Additionally, the chapter also outlines all components pertinent to the qualitative approach, which include an overview of the target (theoretical) population, the study interviewer's eligibility criteria, and the reason for selecting these criteria. Furthermore, the chapter presents the justification for choosing a non-probability (non-random) sampling technique in the form of the purposive sampling technique. The chapter additionally lays out the sample size considerations.

This chapter shall also discuss the data collection methods, such as the allocated semi-structured interview technique. Thereafter I provide information on how I compiled and designed the questions of the interview based on existing studies in the literature. I describe how the recruitment process of the study's participants was conducted and discuss the translation technique for the documents pertinent to this qualitative protocol. Furthermore, the chapter presents a justification for selecting thematic analysis (TA) to analyse the interview transcripts. Likewise, the chapter also demonstrates in detail all components related to ethical considerations that were implemented in order to comply with the guidelines and practices of research ethics. Last but not least, the chapter also discusses the reasons why a pilot study was carried out and presents all the lessons learned. Finally, the chapter discusses the trustworthiness, credibility, and dependability of the qualitative research data.

4.2 My Positionality

This paragraph will discuss my relevant historical background, views, and philosophies, which may have informed my choice of research subject and methodology for this study. According to Sikes (2004, p. 18), it is critical to understand 'where the researcher is coming from' in terms of their philosophical viewpoint and fundamental assumptions, cultural-historical background, gender and roles in society, since this may impact the methodology and procedure selection and application. Portelli (2008, p.83) states that she 'had to acknowledge that the ideas and understandings I had been attempting to obtain as a researcher may be impacted or warped by both the "individual/personal me" and the "professional me"'. Thus, my decision to investigate kindergarten teachers' ideas is informed by my own historical and cultural context, as well as my own experiences and interests. I will begin by outlining features that influenced my decision to conduct this research, followed by a description of my ontological and epistemological assumptions.

4.3 My Life History

Growing up in Saudi Arabia, the first technological tool I had the opportunity to use when I was a child was an instant camera. I liked taking photos of different objects. Also, I loved watching TV and cartoons, and I learned a lot from watching these cartoons. For example, I understood that other people have different appearances and traditions from the ones in Saudi Arabia. Watching these cartoons highly impacted my understanding of the concept of being different. Following this, I gradually began learning about a few abstract concepts such as love, friendship, sacrifice, patience, dignity, and hope. Thus, my decision to investigate kindergarten teachers' ideas is informed by my own historical and cultural context, as well as my own experiences and interests during my development as a child.

It was tough for me to get a cell phone since such technology is considered taboo for youths in our community in Saudi Arabia. I wished desperately for a cell phone, but my father objected. He did, however, purchase one for me after I inquired numerous times.

It was also difficult to get an Internet connection at home due to my society's fear of abusing it. As a result, I enrolled in a gym with an Internet café. I went to the gym every day only to be able to use the Internet. I then started exploring this virtual world and expanding my horizons. Additionally, I learned how to create greeting cards and share them with people. After a time, my older brother purchased a desktop computer for me, which enabled me to learn about computers. In 2002, I enrolled in a university with a specialism in pre-school education. Additionally, I took one computer course. The training was basic and presented simple concepts that I was already familiar with from my personal computer knowledge. I purchased a digital camera in 2004 and had really been enamoured with photography in general. Additionally, I learned how to use the computer application 'Photoshop', which allowed me to manipulate and edit photographs. Following up on this, I loved to enter my pictures into online competitions.

After graduating from university, I worked for four years as a professor in the Early Childhood department at King Saud University. I taught a variety of courses and oversaw field training for early childhood students. My supervisory duty was to facilitate weekly seminars in which I explained many aspects of child development, child requirements, teaching styles, the framework of kindergarten's daily periods, and classroom management. Additionally, I saw a few instructional techniques in which I could give criticism and remarks to teachers. I realised that the only technical device used by teachers in English language lessons was digital audio. Additionally, I recall only one school having a computer lab that students used once a week.

In 2011, I was awarded a scholarship to study in the United States for an MA degree in Early Childhood/Education. I also had the opportunity while working on several initiatives to work alongside early childhood teachers and preschool-kindergarten children. While completing my projects in several schools, I saw a few schools use televisions to allow students to view instructive films. Other schools had laptops in the classrooms that students were allowed to use during free hours.

Additionally, in a college in the United States, I worked as a director assistant at a child development/education centre as part of my practicum. I developed personal connections with each teacher and evaluated and aided other teachers in improving their classrooms, learning environments, and curriculum, in addition to attending periodic teachers' meetings. While I was working at the centre, I noted that teachers utilised just digital audio to play songs for the children and that they generally lacked additional electronic equipment in the classroom. However, after school, select students were permitted to attend the school club (in a designated room) for two hours. They had studying areas and were permitted to use the computer at the club.

All of these views and experiences, whether in the Kingdom of Saudi Arabia or the United States, prompted me to consider the critical nature of using technology as digital

technologies seem to be naturally interesting and engaging for young children and enable them to develop their interests, peer relationships, and learning through play. I saw that children like working on computers and that they often had to queue to use one. As a result, it became clear to me that technology might be a valuable pedagogical tool. However, the issue that arises is how can teachers incorporate technology into their classrooms? In other words, how can teachers' attitudes on the value of technology in education be changed?

Along with my academic and professional accomplishments, I am the mother of four children. I can immediately see a difference in my two boys' educational levels (to mark these differences, and for ease of distinguishment, I shall refer to each boy as S1 or S2 (S1 is six years old, and S2 is seven). S1 missed a year of the school prior to first grade, but S2 has been in day care and school since he was born. When S1 was at home, he was using an iPad. He watched a few cartoons and experimented with several applications. For me, it was clear that S1 had acquired a greater vocabulary than S2. Additionally, S1 was able to pick up some basic arithmetic skills, such as addition and subtraction. I was blown away by S1's learning despite his absence from school. Accordingly, this was a major experience that has provided a foundation for my own perspective.

Personally, I think that technology is critical for children's education since children today are the digital generation, and it is critical for parents and schools to support their interests and utilise technology as a tool for learning. On the other hand, I believe that technology has possible negative consequences. Thus, my perspective is divided, and my academic experiences and work with multiple teachers show that it may not be only me who has a mixed stance but also other teachers. Additionally, teachers have divergent views on allowing students to use the technologies and available programmes and apps. This inspired me to research kindergarten teachers' perspectives, understand their ideas, discover the elements that influence their attitudes, and identify the hurdles to the use of technology that they confront.

4.4 My Ontological and Epistemological Assumptions

Researchers in the social sciences make implicit or explicit assumptions about the nature of the social environment and the techniques employed to study it (Burrell & Morgan, 1979). Ontology is a branch of philosophy concerned with concerns of existence or being; it is concerned with the question, ‘what is there that can be known?’ (Guba & Lincoln, 1989, p. 83). In terms of my ontological stance, I concur with the notion that knowledge is socially formed, subjectively experienced, and the product of human thinking represented in the language (Sikes, 2004, p. 20), which indicates that researchers must be as cognisant of participants’ perspectives as is feasible (Creswell, 2003). As a result, I see knowledge as an abstract reality capable of being conveyed interactively between persons.

Epistemology is concerned with questions of knowledge sources and the interaction between the researcher(s) and the subject of investigation (Denzin & Lincoln, 2005). Thus, the primary epistemological issue is ‘how do we know what we know?’ (Crotty, 1998, p. 8). As a result, I see knowledge as ‘individual, subjective, and distinctive’ (Cohen, Manion, & Morrison, 2005, p. 6). In general, with respect to these two ontology and epistemology viewpoints, the research methodology I used involved the collection of people’s perspectives and ideas about a social phenomenon (kindergarten teachers’ beliefs about the use of technology), as these are the most applicable procedures for collecting and analysing data to create reliable knowledge and establish trustworthiness in the context of this study.

The next section will focus on an overview of the methodology.

4.5 Overview of the Methodology

Methodology refers to the strategy, action plan, method, or design that guides the selection and use of certain research methodologies (Bryman, 2016). Creswell and Poth (2017) recognise the following fundamental roles of research design: it can provide answers to research questions systematically by adopting various steps logically, and it provides a roadmap

for carrying out a study through adopting a suitable approach (in this case, qualitative approach). The diversity of methods with which research studies are conducted may reflect differences in researchers' beliefs and perspectives (Bryman, 2016). However, adhering to a research paradigm, in terms of certain standards and rules, offers researchers a framework for choosing the methodological approach that is best aligned with their research questions (Creswell & Poth, 2017). A diverse range of data collection techniques and analysis procedures has been depicted by Saunders, Lewis, and Thornhill (2016) in their so-called 'onion' model, shown below in Figure 4.1. At the core of the onion are the techniques for collecting data and data analysis; the middle layers are the strategy choices and time horizons, and the outer layers are the philosophies and approaches. After the research philosophy has been chosen, the next layer is peeled away to decide on research techniques and timelines before choosing a data gathering tactic at the centre (Saunders et al., 2016).

The current research has utilised and applied the Saunders et al. (2016) developed and enhanced research onion model. The onion research model comprises a number of nested layers; every single sphere of these multi-layers directs to a vital phase of the methodological approach that was used to guide this study. These nested layers are categorised into various layers. The following layer in the model was indicated to be a research approach in the form of an inductive approach. The next layer was signified by a research strategy that was assigned to guide this study in the form of a case study. The consequent sphere was a choice in this thesis which was to employ a qualitative (inductive) approach, while last but not least, a time horizons layer was inducted into the time frame taken to implement this study which was a short period of time (cross-sectional) as an alternative of collecting data over time (longitudinal). It was therefore decided to use an in-depth interview approach and a theme analysis technique in this study's data collecting and data analysis, in line with the customised research onion model.

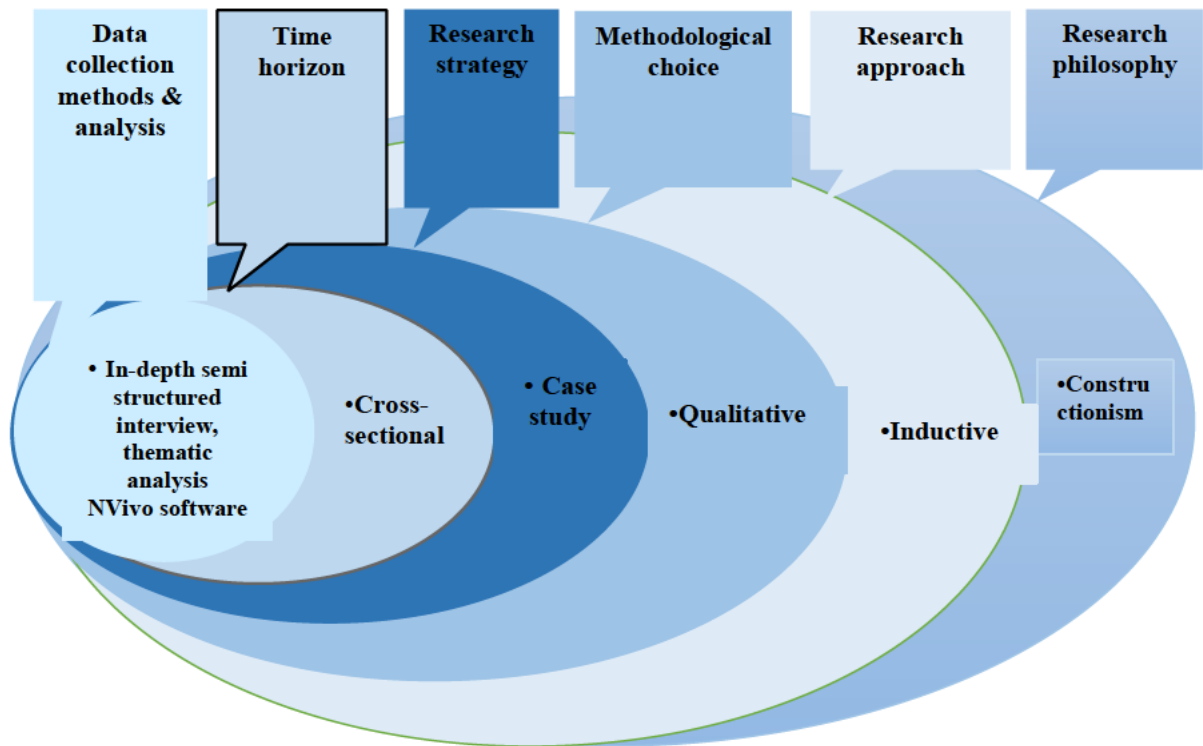


Figure 4-1 All methodological strategies used in this qualitative study (Onion Model Flowchart of the Qualitative Approach). (Source: Saunders et al., (2016).

The flowchart (Figure 4.2) shows all stages that were implemented in the research design. The subsequent sections of this chapter present, discuss and justify in-depth the reasons for selecting each stage in keeping with the adopted methodological strategies in order to address the three research questions and achieve all aims and objectives.

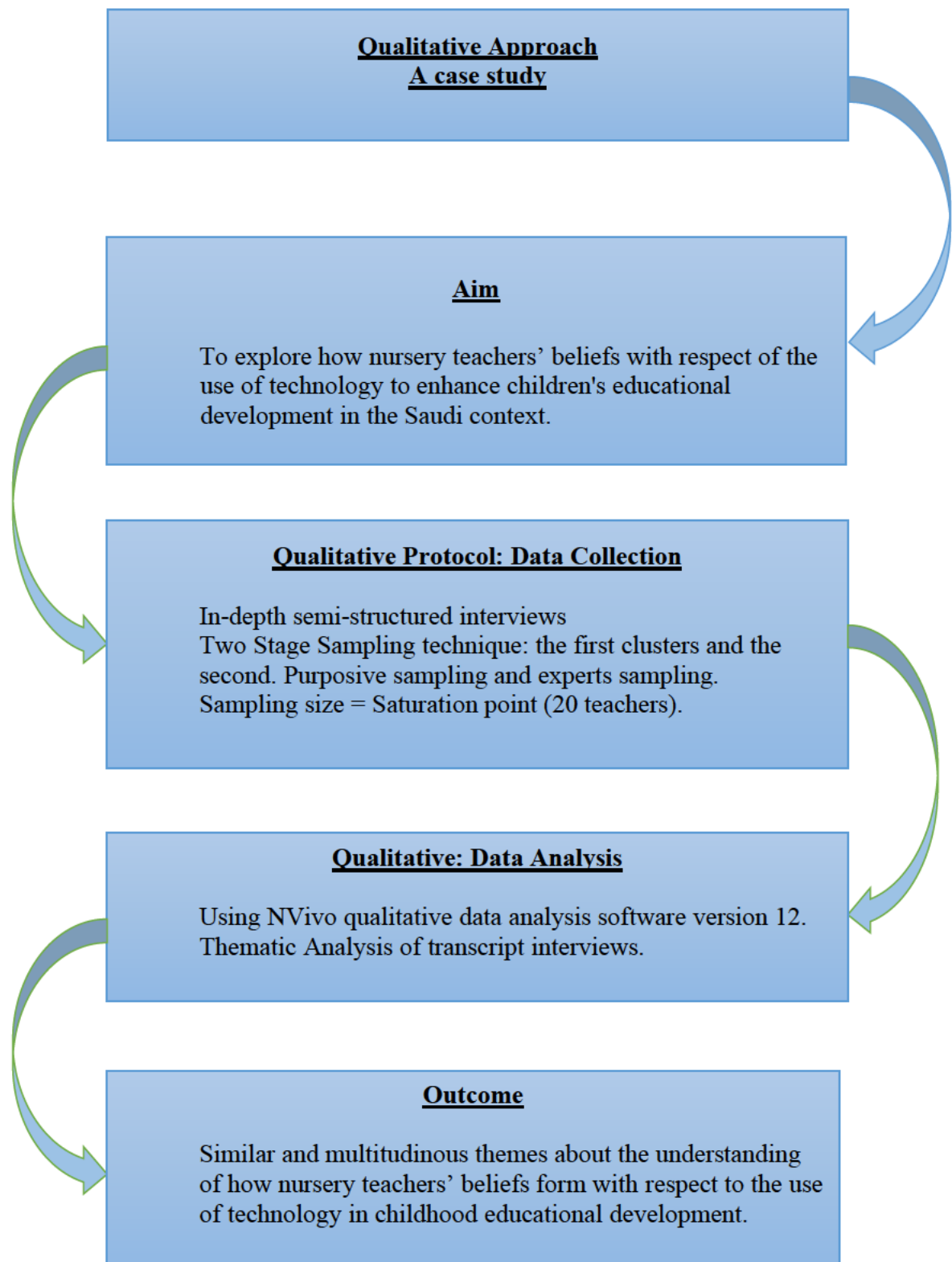


Figure 4-2 Flowchart of the qualitative protocol

4.6 Justifying Selection of a Qualitative Approach

A substantial amount of literature has suggested that study designs should be determined by the general nature of the examined issue. In addition, when selecting a research design, the researcher must consider the population under study, an applicable sampling procedure and data collection methods. Furthermore, researchers should also consider appropriate data analysis techniques, ethical guidelines and rules, interpretation of the findings, and the plans for disseminating the findings of the research (Bryman, 2016; Creswell & Poth, 2017). The following sections discuss these points.

4.7 Researcher's Worldview

A substantial body of literature suggests that a paradigm is considered to be a comprehensive belief system, worldview, or a form of the framework which is able to guide research. Ontological, epistemological, axiological, methodological, and rhetorical assumptions disclose paradigm. Diverse writers vary in the logical order for examining these assumptions (Creswell & Poth, 2017). There is consensus among experts in the critique of the What is the shape and nature of reality, and what can be understood about it, is an ontological challenge. The following logical argument is epistemological: what is the connection between the researcher (explicit knowledge) and what can be understood? And who can produce knowledge? However, the remaining assumptions are still controversial aspects among scholars. These assumptions include axiological, methodological, and rhetorical assumptions (Leavy, 2014).

4.8 Research Philosophy

Bryman (2016) and Ryan (2018) have asserted that there are three main effective paradigms employed widely in the social sciences. They are positivism/post-positivism, interpretivism/constructivism, and critical theory. The following sections present each

paradigm in detail and discuss all components of each research paradigm in terms of ontology, epistemology, and methods.

4.9 Positivism Paradigm.

The word positivism refers to a school of philosophy that gained prominence in the early nineteenth century as a result of the writings of the French philosopher Auguste Comte (Richards, 2003). Positivism is seen as a component of the belief that true knowledge is objective and quantitative. Similarly, positivism is not controlled by the senses but rather by unchanging rules. As a consequence, positivists' perspective is associated with realism, which pushes positivists to comprehend the social world as if it were the natural world, where a cause-effect connection exists and connects occurrences, and once such connections are made, future certainties may be forecast. Thus, it is understandable that positivists have the same ideas as those in the social sciences field (Rehman & Alharthi, 2016). The positivist technique, notably, is based on experimentation.

Quantitative data may be gathered via experiments, standardised examinations, and surveys employing closed-ended questionnaires by certain positivist researchers in order to answer research questions and create credible hypotheses. The numerical data created by these procedures are regarded to be descriptive statistical data (Rehman & Alharthi, 2016). However, due to reality being context-free, various researchers who operate at different times and locations will likely attain the same conclusions on a phenomenon that is understudied (Rehman & Alharthi, 2016). As a result, the epistemological position of positivists is considered to be the same position as that of objectivism, as researchers are considered to be objective observers in the study of independent phenomena with which the researcher has no direct interaction. However, instead of displaying outcomes, objectivists attempt to use words to describe the phenomena in their real form without any direct interference. Correspondingly, many scholars have, as a result, critiqued the positivist approach, as despite the objective and

scientific methods being appropriate for the studying of natural objects, these aspects are not considered to be successful when applied to social phenomena (Rehman, & Alharthi, 2016; Richards, 2003).

Criticism of positivism has resulted in the birth of post-positivism, which combines positivism with interpretivism (Grix, 2004). As a consequence, post-positivism was seen as an effort to remedy positivism's shortcomings. The new concept's ontological stance is much more correct since it posits an independent reality. Nonetheless, reality can only be partially comprehended owing to the complexity of established social phenomena, which take into account both the researcher's opinions and what the researcher sees (Grix, 2004; Gage, 1989). As a consequence, the positivist paradigm has been criticised by interpretivism and critical theorists. One of the most often levelled critiques is that scientific approaches are inadequate when it comes to examining humans and social phenomena (Gage, 1989). Despite this critique, the positivist paradigm may have varying degrees of depth and may be applicable to a variety of research investigations.

The main variance between positivist philosophy and constructivism (also known as constructionism) in relation to reality is that while positivism discusses and argues that most knowledge is produced and generated in a simplified scientific method, constructivism as a paradigm for teaching and learning projects that knowledge and information gained on the phenomenon under study is constructed and generated by scientists. Constructivism also opposes the suggestion and notion that there is a unique methodological approach that can generate knowledge related to the phenomenon under study (Denscombe, 2017).

4.10 Constructivist paradigm

Constructivist or interpretive approaches involve focusing on the development of insights about the beliefs of individuals and also on their experiences through the use of qualitative data (Denscombe, 2017). In the words of Schwandt (2014), 'the constructivist seeks

to explain how human beings interpret or construct some *X* in specific linguistic, social, and historical contexts. In addition, many constructivists hold that *X* is something that should be severely criticized, changed, or overthrown' (p. 39).

In this respect, Schwandt (2014) also depicts *X* as the three types of constructs;

- (1) States of affairs (childhood), practices (domestic abuse or neglect), situations (such as a lack of adequate nutrition or a lack of access to adequate health care), and acts (calling anything illegal or deviant);
- (2) Ideas—including conceptions, beliefs, theories, and attitudes;
- (3) In sum, all there is to know about the world, including the facts, the truth, the reality, and the knowledge.

This form of paradigm focuses on exploring and understanding the perceptions and thoughts of human beings. Accordingly, the constructivist approach can be described as a paradigm which seeks to understand any social phenomena rather than present the researcher's own impressions and ideas (Cohen et al., 2007; Rehman & Alharthi, 2016). This goal of fundamental understanding makes it possible for both the researcher and participants to provide the required interpretation regarding a particular topic (Elkind, 2005). According to Schwandt (2007), interpreting a topic based on the understanding of the participant is relevant for the researcher since it opens leeway for new and appropriate conclusions. Based on this paradigm, different methodologies can be employed while attempting to generate knowledge.

This is not the case with the positivistic paradigm, which dictates that the scientific method is the only relevant procedure that can contribute to the understanding of the required information. The constructivist paradigm is therefore based on the understanding of social events from different points of view (Creswell, 2005). This factor makes it possible for the researcher to employ a suitable methodology while attempting to obtain in-depth data. Constructivists are required to focus on a single concept or phenomenon. Even though different

methodologies can be employed while focusing on such a concept, these professionals are expected to consider the setting of the participants before focusing on the phenomenon (Andrew, Pedersen, & McEvoy, 2011). In this research, focusing on the setting of Saudi Arabian teachers will make it possible to understand some of the factors which may influence their beliefs regarding the application of technology in their services.

The effective aim of the constructivist paradigm is not to explore what constitutes scientific truth and knowledge but to attempt to understand and observe human beings' perceptions of the social realities with which individuals engage (Rehman & Alharthi, 2016). According to Rehman and Alharthi (2016), the concept of knowledge is an inescapable consequence of explanatory ontology. Supporters of this paradigm who believe in the social construction of realities pursue realities that can be approached from diverse angles based on the perspectives of informants.

Knowing personal values can predict multiple types of attitudes, preferences, and behaviours (Sagiv et al., 2017). Therefore, the research seeks to understand more about the participants' personal values in order to understand the data. Consideration of personal values research is relevant since it enables the constructivist to apply ethics throughout the study. Correspondingly, the reality of the work depends on the researcher's sincerity in interpreting the data being studied and also on their sincerity toward research ethics (Lin, 1998). Ethics are some of the key guidelines which enable a researcher to respect the private information obtained within the research. Constructivist explanations help to achieve a broad description of the phenomenon under study. The existence of sufficient information makes the reader feel convinced that the researcher depicts the world rather than depicting a specific hypothesis (Lin, 1998).

Since this research is focused on Saudi Arabian kindergarten teachers' beliefs regarding the use of technology among children, I will be interested in all information related

to the responses provided by study participants. I will therefore focus on all possible factors, including the lives of such teachers outside the learning institution. The major focus will be on a general overview of the study, as well as a focus on the disparities which exist among the beliefs and practices of the participants. Employing the constructivist paradigm will make it possible to develop and employ the required information within this paper. However, the constructivism philosophy has been criticised widely in comparison to other paradigms and has been accused of being 'light', unqualified for producing and generating theories that can be utilised broadly or generalised to other study settings, or otherwise, subject to environmental bias from the researcher and participants (Grix, 2004).

Still, the constructivist paradigm relies on interpreting data (Schwandt, 1994). Therefore, effective interpretation of the data, for instance, via noting the repetition of words and phrases, obtaining primary and secondary data, and reliably searching for missing information, will together make it possible to understand the phenomenon being investigated.

4.10.1 Ontology

According to constructivists, the reality is considered to be relative and based on social and experimental procedures. The content provided by the participants involved in the research provides the understanding required for studies (Guba & Lincoln, 1994). The position held by constructivists aids this since it enables researchers to make the required interactions between the topic and other factors that may affect it in different ways (Guba & Lincoln, 1994). Understanding the relationship between the concepts which impact the beliefs of Saudi Arabian teachers provides an understanding of the technological influence on the education provided to children at the kindergarten level. Employing the methodology of the discussed paradigm also makes it possible to understand the beliefs, which are likely to vary according to age, type of training and length of service. However, this study will be females only, which makes this culturally distinctive as it is conducted in Saudi Arabia.

4.10.2 Epistemology

Epistemology dictates that constructivists should focus on subjective interaction as a way of understanding the realities which exist among the respondents' minds (Guba, 1990). Interacting with participants is essential in that it enables a researcher to acquire the required data and can also enhance the ethical responsibility of the researcher towards the participants. Factors that influence the interaction with the respondents should therefore be analysed carefully to ensure that the participants are confident while providing key details. An example of such factors includes effective communication and showing respect for their cultural practices and private information. The interaction can be through any method of qualitative research, such as the use of interviews. In this research, the beliefs of the participating Saudi Arabian kindergarten teachers must be respected to ensure that they are willing to participate in the research. Understanding their beliefs and showing an interest in their reasoning was able to improve their willingness to engage in the study. They were also capable of providing relevant information, which is crucial for the process of coming up with effective recommendations for the research.

Based on the comparisons made between the positivist and constructivist paradigms, the latter seems to be more appropriate for this research. The constructivist paradigm will guide the research since it helps to 'discover what actions mean to the people who engage in them'. In the words of Neuman (2011), 'people have their own reasons for their actions, and we need to learn the reasons that people use' (p. 104). Therefore, in this research, I was keen on employing face-to-face interviews to obtain data from Saudi Arabian teachers. Focusing on their beliefs required me to understand both the concepts and the settings of the respondents. Such understanding was based on the impact of digital technologies in their pedagogical practices. An understanding was also required to interact with the respondents since the process allowed the researcher to understand some of their cultural practices. Ensuring effective

communication with respondents should allow the researcher to gain access to detailed data and sustain respectful, ethical relationships.

4.11 Research Approach

Inductive reasoning involves moving from specific observations to a broader array. It may also be referred to as a bottom-up approach and can be used to create theory from observations (Bryman, 2016). See Figures 4-3.

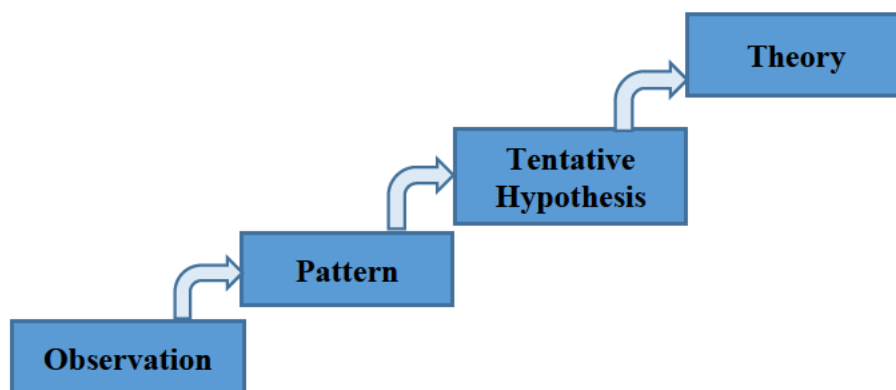


Figure 4-3 Inductive reasoning approach

There are two distinct types of research: primary and secondary research (Bryman, 2016; Creswell & Poth, 2017). Having a dearth of studies in the Saudi context on nursery teachers' beliefs with respect to the use of technology in order to enhance the children's educational development, along with insufficient pre-existing information or reliable, valid, and accessible governmental or organisational information on the topic, directed me towards undertaking an effective qualitative study (Bryman, 2016). However, the existing studies exploring nursery teachers' perceptions are few and far between and are based either in developed or developing countries. Therefore, this study has disregarded the secondary research and seeks instead to evaluate various primary data (and may thus be considered primary research) from a qualitative perspective.

A significant body of literature classifies primary research into three broad categories: quantitative, qualitative, and mixed approaches (see Bryman, 2016; Creswell & Poth, 2017). Mixed method designs are considered reliable as they allow researchers to integrate the two primary standard approaches (namely quantitative and qualitative) in order to obtain valid and reliable merged results. This study has, however, rejected the mixed method design as it typically requires a longer time scale to carry out. Furthermore, mixed-method designs also require high skills with respect to performing the main fieldwork of data collection, analysis of the data, and interpretation of the results if it is to be implemented in a limited timeframe; hence, this study was unable to adapt and undertake the mixed-method approach to address the research questions. To account for the alternatives, I shall now evaluate the remaining approaches, namely quantitative and qualitative approaches (Bryman, 2016; Creswell & Poth, 2017).

With the mixed-method design discussed, to an assessment of a quantitative approach. Quantitative research is classified as descriptive, quasi-experimental, experimental, and correlational (Bryman, 2016; Edmonds & Kennedy, 2016). Due to the fact that this study did not change the variables (for instance, other year groups in school) (dependent and independent variables), quasi-experimental and experimental studies were excluded. With this in mind, an observation design is worth noting for the present research— Observational studies include all three types of research: cross-sectional, case-control and prospective and retrospective cohort studies (Bryman, 2016; Edmonds & Kennedy, 2016). All three research designs require considerable time and travel expense and are resource-intensive to carry out regarding selection bias (Omair, 2016; Song & Chung, 2010). Therefore, each of the quantitative approaches was ruled out for the present study. Hence, by the process of elimination, the qualitative research approach is the final approach deserving examination.

Qualitative research is used in a variety of educational areas, including sociology, psychology, and history. According to Flick (2014), ‘qualitative research is interested in analysing subjective meaning or the social production of issues, events, or practices by collecting non-standardised data and analysing texts and images rather than numbers and statistics’ (p. 542). Furthermore, Denzin and Lincoln (2000) claimed that ‘qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter’ (p. 2). As stated by Denscombe (2007), qualitative research can include the use of text and visual methods such as photographs, which are considered to act as basic data rather than numbers. The researcher also categorises qualitative research as an interpretive approach with qualitative methods based on case study design, which is considered to be of crucial concern for the social construction of knowledge; investigative of meanings and how people comprehend certain features; and investigative of behavioural patterns, cultural norms, and linguistic forms.

With this in mind, I selected and employed a qualitative method for a variety of reasons. To begin, as Miles and Huberman (1994) noted, qualitative data enables the generation of ‘detailed descriptions’ (p. 10) of the phenomena under inquiry in their natural setting. Second, this study’s focus is on teachers’ beliefs on the use of technology in kindergarten, and Sutton & Austin (2015) indicated that qualitative research could assist the researcher in comprehending and exploring participants’ feelings, thoughts, beliefs, and opinions, as well as determining why they hold these feelings, beliefs, and opinions, which may affect their behaviour. Additionally, Yin (2011) has stated that a qualitative method enables a researcher to investigate ‘the viewpoints and perspectives of the study’s participants (p. 8). A qualitative method allows the researcher to conduct a more in-depth examination of the subject. By conducting a thorough examination of the subject research phenomenon, it will be possible to produce results that lead to a fuller comprehension of the issue.

Finally, Maxwell (2012) argues that qualitative research designs, namely the interactive method, have a flexible structure due to the design's ability to be improved, refined, and duplicated to a greater level. Flick (2011) also suggests that by using qualitative research methodologies, proper assessments of any topic may be developed, and so they will be able to provide their own responses. As a consequence, many concerns may be readily implied, and this study will provide prompts to make these concerns more explicit.

Qualitative research may be categorised into five major research approaches. These are narrative, ethnographic, phenomenological, grounded-theory-based, and case study approaches (Bryman, 2016; Creswell & Poth, 2017). According to Creswell and Poth (2017), each of the five qualitative approaches have strengths and limitations by which the researchers can justify the appropriate approach that might enable them to address their research questions according to the strengths and limitations of each approach. Three of the qualitative approaches, including the phenomenological approach (which contains bias and can cause misleading in the study outcomes), the grounded-theory-based approach (bias, reliability and validity of studies of this approach are considered to be unmeasurable) and the ethnographic approach (this approach is time-consuming, and is generally exclusive to career researchers) are profoundly criticised (Bryman, 2016; Creswell & Poth, 2017). The strength of the narrative approach, on the other hand, lies in its flexibility—however, the results gained from this research approach present difficulties in interpretation as it is difficult, or occasionally even impossible, to write a clear, concise description of the narrative at hand, which in turn leads to a distorted understanding of the topic (Bryman, 2016; Creswell & Poth, 2017). Therefore, this study has ruled out these approaches, and so I turn to a case study approach.

The case study approach can provide detailed information (rich qualitative data) and often provides insight for further research. A case study concentrates on and generally addresses a single unit; hence the approach often fails to generalise its own findings to other

target populations (Creswell & Poth, 2017). Nevertheless, this approach enables researchers to gain insights into the production of rich narrative descriptions. Furthermore, the case study approach is considered to be applicable for answering research questions because its strengths often outweigh its limitations (Bryman, 2016). Thus, researchers select the case study approach as an effective approach when they have justified the nature of the research problem, and particularly when the study focuses on one main aspect. Additionally, case studies can provide explanations for exploring complex social phenomena comprising numerous variables. The case study approach is considered to be useful for evaluating programs and thus for studying educational innovations (Creswell & Poth, 2017). Beyond this, Heale and Twycross (2018) have argued that employing a multiple-case research study grants for more in-depth perceptions and understanding of the cases as a unit through the comparison and contrasting of the individual cases. Furthermore, multiple-case studies enable more comprehensive discoveries of theory development and formulations of research questions (Bryman, 2016; Creswell & Poth, 2017). Therefore, this study has adopted a multiple case study approach which has guided this study in addressing the research questions and achieving the stated aims and objectives.

4.12 The Target Population and the Eligibility Criteria for Participants

The target population for this study were teachers who work at public kindergartens in Riyadh, Saudi Arabia. This is due to the fact that Riyadh is the most ethnically diverse city in Saudi Arabia, so it will be the most representative of the population. The eligibility criteria for the interviewees who have taken part in this semi-structured interview are listed in the section to follow.

4.12.1 Inclusion Criteria for the Interviewees

The inclusion criteria are as follows:

- The participant must own Saudi citizenship, as this study aims to explore and understand in depth the nature of beliefs, perceptions, and thoughts of Saudi kindergarten teachers with respect to the use of technology in order to enhance the children's educational development.
- The participant must be over the age of 25. In the Saudi context, individuals typically attain qualifications from universities at the ages of 23–25. For the purposes of this study, it is desirable that teachers be qualified and somewhat experienced in their profession, and so participants should have been over 25 years of age.
- All participants must be female. Saudi authorities allocate only female teachers in kindergartens.
- The participant must speak Arabic fluently. Arabic is the language of operation at Saudi Arabian kindergartens.
- Participants must have a minimum of three years of experience working at kindergartens in Riyadh. Seniors in the field generally have a great deal of knowledge that they can provide during interview sessions; this enhances our understanding of the topic under study (Wu and Patel, 2014).
- Participants must have expertise in using technology (touch screen devices, computers, interactive applications) in the classroom. It is significant to recruit teachers who typically use technological devices in the educational process to teach their students, so they can sustain dialogues in interviews with a relevant history of experience and knowledge.
- The participant must have earned at least a BA to maintain and sustain the interview to flow smoothly without interruption.

- Participants volunteered in the study.

4.13 The Site of the Study.

This study took place in five kindergartens in the following five districts of Riyadh, Central Province, Saudi Arabia: the east, south, west, north, and central districts.

4.14 Riyadh as a Location for Data Collection

Riyadh is the capital of Saudi Arabia, with a population of 6.9 million inhabitants. Residents live in a multicultural and multi-ethnic society, with Riyadh being the third-largest city in the Middle East Region (MER) (United Nations, Department of Economic and Social Affairs, Population Division, 2018). All of the vital government ministries are located in it, including the Saudi education ministry, which has established numerous kindergartens in the city's five main districts. With regards to The Pre-School Education Programme (PSEP), the Saudi education ministry has established numerous kindergartens across the country, alongside kindergartens established and administrated by non-governmental organizations (NGOs). It is worth mentioning that several NGO kindergartens have been ranked as the top kindergartens across the country.

Consistent with the Saudi Vision 2030, which aims to reduce Saudi Arabia's reliance on oil, differentiate its economy, and improve and develop public service sectors, one of the main pillars of Saudi Arabia's Vision 2030 is developing the educational sector through providing development opportunities to the Pre-School Education Programme (PSEP) and intensifying the programme by establishing modern digital kindergartens, and activating its association with the education system (Allmnakrah & Evers, 2019). In particular, the strategic objectives of the National Transformation Program of vision 2030 states 'Improving recruitment, training and development of teachers and 'Improving curricula and teaching methods. The scheme also aims to increase kindergartens' proficiency in performance,

employing and integrating technologies in the education system. Therefore, this study has selected Riyadh as the location for data collection of this qualitative research because it is ahead of the trend in Saudi Arabia in terms of digital use in preschools (Allmnakrah & Evers, 2019).

The Kingdom of Saudi Arabia's ECE system is separated into two types of settings: nursery (ages 0-3 years) and kindergarten (3-6 years of age) (Aljabreen & Lash, 2016). Specifically, this study is mainly focused on the kindergarten settings in Saudi Arabia. Children enter kindergarten grade one (KG1) at the age of three and leave at kindergarten grade three (KG3) (ages 5 and 6) (Madini, 2005). Due to the fact that the government mandates all kindergarten teachers and caregivers to be female, children of all sexes are authorised to attend kindergarten institutions (Al-Jadidi, 2012).

According to the MoE's Organizational guide for Nurseries and Kindergartens in Saudi Arabia (MoE, 2018), kindergartens in Saudi Arabia are classified into three categories: public, private, and applied public. Kindergartens classified as public are those that are open to the general public. An applied public kindergarten is a unique type of kindergarten that provides administrative and technical aid to all the staff of kindergartens. Its specific goals include assisting public and private kindergartens in improving their performance and providing workshops and training courses related to the early year stage; however, only recently (as of 2020) started to provide technical education to the staff.

Specifically, the MoE has made substantial efforts to build kindergarten-specific rules and policies that will enable kindergarten personnel to recognise their unique tasks and responsibilities as well as to confidently carry out their responsibilities in the future (Alshantqi, 2018). Following the MoE's 2016 introduction of: “the Organizational guide for nursery and kindergarten”, “the Procedural guide for nursery and kindergarten”, and “The Teacher guide for the Self-learning Curriculum in Kindergarten” (MoE, 2018), there has been an increased awareness of the importance of organisational management, improving collaboration between

headteachers, teachers and families leading to an improvement in practice (Tatweer, 2017). According to the Teacher's Guide (MoE, 2018b), some of the responsibilities of kindergarten management include establishing a positive environment for children, allocating daily tasks among employees, coordinating teachers in the classroom, and communicating with the appropriate authority. As a result, this is initially a major step to the implementation of technology as all these factors become important once technology begins to be implemented in a kindergarten setting.



Figure 4-4 Map of Saudi Arabia, including Riyadh, the capital city.

4.15 Sampling Technique

There are two main sampling schemes that are usually implemented in three different types of research; namely, qualitative, quantitative, and mixed-method designs, which comprise probability sampling and non-probability sampling. With respect to probability sampling methods (random sampling), the method is one by which each person in the population has a comparable chance of being selected randomly, and with participants being representative of the accessible population. Simple, systematic, stratified, cluster, and multi-stage random sampling techniques are the five major forms of probability sampling that

are often used in quantitative approaches to generalise study results to the broader population (Bryman, 2016; Creswell, 2017).

Despite the fact that probability sampling methods are widely employed in quantitative research, this qualitative study has nevertheless disregarded all types of probability sampling due to the absence of a sampling frame for the target population. The sampling method is also considered to be costly and time-consuming to implement. This study rather utilised the cluster sampling technique, for which I divided Riyadh into five districts east, south, west, north, and central districts. Afterwards, I selected only one kindergarten for each region in Riyadh in order to gain extensive and diverse perceptions and beliefs from different teachers about the use of technology in the educational process.

I employed a non-probability sample (NPS) approach, which is broadly used in the qualitative approach (Creswell, 2014). Despite the fact that there are several non-probability sampling systems, they all include inadvertent, accidental, or convenience sampling, purposeful or judgmental sampling (which includes whole population and expert sampling), snowball sampling, and deviant case sampling, as well as sampling for maximum variation, homogenous sampling, and typical case sampling. This study has employed the purposive sampling technique in the form of a maximum variation sampling due to its economic proficiency, as well as due to its being effective in decreasing the risk of bias (sample selection bias is considered to be the selection of non-random data specifically in terms of statistical analysis) and it can gather vital data effectively. Overall, the strategy enables researchers to choose instances in a speedy and cost-effective approach, which is especially significant when both time and financial resources are in limited supply (Bryman, 2016; Creswell & Clark, 2017). Furthermore, a purposive sampling technique can be used to capture a wide range of perceptions connecting to the themes that the researchers are attracted to in their research. This is particularly true for maximum variation sampling (a maximum variation sample consists of

various cases that are selected due to their internal variety. In other words, maximum variation sampling collects a wide range of participants who have varying viewpoints in order to effectively study a certain phenomenon), as the sampling method explores differences in perceptions and beliefs between the informants in order to provide researchers with considerable knowledge and information on the topic under examination (Bryman, 2016; Creswell & Clark, 2017). Therefore, this study has employed a purposive sampling technique in the form of a maximum variation sampling technique in order to sample kindergarten teachers in Riyadh. This study recruited 20 participants from five different kindergartens in Riyadh.

4.16 Sample Size

In a quantitative approach, calculating sample size using different approaches (such as formulas or standard tables or sample size calculators online) is applicable, and the calculation is affected by numerous factors, including the margin of error, confidence levels, and the proportion or percentage of the sample (Bryman, 2016; Creswell & Creswell, 2017). However, in a qualitative approach, calculating sample size is a controversial issue among researchers and methodologists. Thus, the first suggestion is that some researchers are required to determine a specific range for the sample size to be between 20–30 in order to gain a variety of perspectives and knowledge from interviews to address the research questions (Bryman, 2016; Creswell & Clark, 2017). Another suggestion is that some researchers adhered to the assumption of saturation points, which is the point at which interview participants begin to have similar viewpoints or repeat the same information as prior interviewees. A saturation point is typically reached at around ten to 15 participants (Bryman, 2016; Creswell & Poth, 2017). Relatedly, some researchers have suggested that interviewing three participants from each unit within the same organisation brings the study to a saturation point (Creswell & Clark, 2017).

These assumptions and suggestions were utilised by this study (saturation point and 20–30 participants), leading to the recruitment of 20 participants from five kindergartens.

4.17 Data Collection Methods

Describing the process of data collection enables the readers to gain an understanding of the nature of the data obtained by the researcher. According to Rugg and Petre (2007), there are several effective procedures that can be employed in the process of collecting data. Such procedures are reliant on different factors, such as the topic being investigated and the preference of the researcher. The researcher should choose the data collection methods that can be applied successfully to achieve the aim of the study and justify it clearly (Denscombe, 2017). This section focuses on the methods employed in obtaining data during this study.

There are three main qualitative research methods which are applied to gather textual data. These methods are observation, focus group discussions (FGDs), and in-depth interviews (Bryman, 2016; Creswell & Poth, 2017). According to Creswell and Poth (2017), coupling and applying two methods of data collection, for instance, in-depth interviews along with focus groups, can develop and enhance the trustworthiness and dependability of various qualitative studies. Therefore, choosing one or two appropriate data collection methods requires logical justifications that should keep with the paradigm and philosophical stance of the researcher.

Observation is considered to be a systematic data collection method by which researchers can notice and perceive the activity of their participants in their fieldwork environment (Bryman, 2016; Creswell & Poth, 2017). Despite the fact that observation is a manageable method which can reveal and produce vital information in a short period of time, observation still has several limitations; for instance, it can be said to lack validity and reliability and can potentially produce faulty perceptions and expectations or the personal bias of the observer (Ciesielska, Boström, & Öhlander, 2018). Having mentioned a number of limitations of the method, this study eliminated the observation technique.

With regards to focus groups, they can often have little difference from in-depth interviews as many of the guidelines for conducting interviews can be employed in conducting focus groups. There is a consensus in the literature that participants in each focus group should not exceed eight at a maximum and not less than three people (Creswell & Poth, 2017). Despite the fact that FGs enable researchers to explore and understand topics and even generate hypotheses, FGs often demand high-skilled trained interviewers in order to be conducted (Bryman, 2016). Along with efficiently gathering diverse data, FGs also come with low costs in relation to other methods. Furthermore, FGs can produce and generate swift primary results that might contribute to addressing and understanding the issue under study at an earlier time than the researcher might plan or predict (Bryman, 2016; Creswell & Poth, 2017). Nevertheless, conducting FGs is considered to be time-consuming in terms of data analysis. Alongside this, the facilitator might face negative outcomes from interactions between the participants which might mislead the results (Bryman, 2016). Given these limitations, this study has ruled out FGs. Hence, I shall evaluate the in-depth interview method.

‘Research interviews are a method of data collection that uses people’s answers to researchers’ questions as their source of data’ (Denscombe, 2017. p. 202). Interviewing is an effective data collection technique in qualitative studies which interrogates or debriefs the participants in order to respond to particular research questions. Interviewing enables the researcher to gain access to information that cannot be researched through the process of observation. The process of interviewing respondents makes it possible to understand and explore their thoughts, beliefs, feelings, and perspectives (Wellington & Szczerbinski, 2007). Additionally, Tuckman and Harper (2012) have stated that interviews enable researchers to ascertain ‘what is "inside a person’s head," which means allowing investigators to determine what anyone knows (knowledge or information), what someone likes or dislikes (values and preferences), and what someone believes (attitudes and beliefs)’ (p. 244). As such, researchers

gather qualitative data via interviews and other approaches in order to get a thorough understanding of people (Bryman & Cassell, 2006).

In this respect, there are three common types of interviews in social science; these are structured, unstructured, and semi-structured interviews (Miller & Brewer, 2003). With regards to structured interviews, the formulated questions are set or standardised in a consistent manner (Bryman, 2016; Creswell & Poth, 2017). Although structured interviews can be conducted somewhat effortlessly due to the interviewer asking a fixed set of closed questions, the answers obtained from the participants are often lacking in detail (Bryman, 2016; Creswell & Poth, 2017). As such, the structured interview technique was ruled out for this study.

The unstructured interview is considered flexible as the questions can be reformed and modified depending on the interviewee's answers. In addition, the interview can deviate from the trajectory of the interview schedule (Bryman, 2016; Creswell & Poth, 2017). Another strength of an unstructured interview is that its open questions enable informants to elaborate upon their own answers, which in turn generate rich qualitative data that enable researchers to understand the phenomenon under study (Bryman, 2016; Creswell & Poth, 2017). However, the method is considered to be time-consuming when it comes to transcribing or even analysing the resulting data (Bryman, 2016). Thus, this study also ruled out the unstructured interview method.

The in-depth semi-structured interview is a conversation exchange between interviewees and interviewer and seeks to derive significant information from interviewees by asking questions and providing probes to guide the participant in order to ensure outcomes from different interviews are comparable. Although interviewers formulated beforehand a list of predetermined questions, semi-structured interviews are frequently described as being conversational in the manner (Bryman, 2016; Creswell & Poth, 2017). Semi-structured interviews can encourage and develop two-way communication between the interviewer and

interviewee (Creswell & Poth, 2017). Furthermore, it produces in-depth data collection and a comprehensive understanding of the topic, so interviewers can more clearly understand the participants' answers and the reasons behind their answers (Creswell & Poth, 2017). According to Gray (2009), the application of semi-structured interviews is considered an effective method which can be employed to explore the view and opinions of the participants. Nevertheless, there are several limitations of the in-depth semi-structured interview; to begin with, it can often be time-consuming to recruit and implement (Bryman, 2016). Travel expenses and costs associated with travelling are other constraints of this method (Bryman, 2016). Despite its restrictions, a semi-structured interview is a feasible data collection technique and was thus employed for this qualitative research. The questions of the in-depth, semi-structured interview were developed and formulated in accordance with the recommendations of previous studies (Montrieux et al., 2015; Mundy & Kupczynski, 2013) (see Appendix 3.1).

4.18 Recruitment of Participants

Once the study was granted ethical approval from the University of Sheffield ethics committee and the MoE research ethics committee in Saudi (See ethical considerations in Section 4.15 and see appendix 3.4 for approved ethics), I held an individual meeting with the headteachers of each the five selected kindergartens in order to discuss with them in detail the purpose and the significance of the project and seek their contributions in overcoming the challenges that the study might face due to, for instance, the risk of reluctance from some teachers to take part in the study. The meeting concluded with the decision to design a formal pre-notification letter (indicating the significance of the project and the timescale of data collection), with which each headteacher would inform their employees about the project by putting up a pre-notification letter on the kindergarten noticeboard (see Appendix 3.1A).

Following this meeting, I gained approval to meet all teachers at each selected kindergarten in order to deliver a small presentation to them on the importance of the study and

all aspects related to confidentiality and anonymity. Several teachers were willing to participate in the study (the sample was thus self-selecting); I then provided volunteers with participant information sheets and consent forms (see ethical considerations in Section 4.15 for more detail).

Interviews were held at times most convenient for the participants and at mutually agreed locations (all interviews were held in a quiet room that would afford privacy for interviewees at each of the five selected kindergartens).

The study successfully recruited 20 teachers from the five selected kindergartens. Each of the interviews lasted between 30 and 45 minutes, and each interviewee agreed to have their interview recorded. All interview sessions were carried out in Arabic, the national language of Saudi Arabia. Concurrently, I acted as the interviewer and transcriber, transcribed verbatim all audio interviews and revised the transcript interviews before sending them to professional translators in order to translate all transcriptions from Arabic to English.

4.19 Documenting the Interviews

Two techniques were utilised to record interview responses: both a digital recording method and a note-taking method. The use of a digital recorder enabled me to freely engage in the conversation during the interview sessions. The main advantage of taking supplementary notes during the interview was to support and enhance the transcribing techniques by adding or explaining some phrases or sentences that were missing during the interview with the key informants.

4.20 Language and Location of Interview

As previously mentioned, Arabic was the language of operation for each interview. The interviews took place in the five selected kindergartens during normal business hours when the kindergarten teachers were at their workplaces. Each of the five selected kindergartens

allocated me a quiet private room to avoid any noise or distraction in order to sustain the sound quality of the interview dialogue.

4.21 The Translation Process in the Qualitative Protocol

This qualitative approach has employed the backwards-forward translation technique, which is generally accepted as one of the most effective techniques for evaluating the standard, feasibility, and quality of translation. Back-translation is a procedure whereby the version of the transcribed texts is re-translated back into the source language by a registered translator who does not have access to the original text. If any contradiction and discrepancies are established between the back-translation version and the original version, then we can conclude errors likely occurred in the target language version (Chen & Boore, 2010; Son, 2018; Tyupa, 2011). The documents that required translation into Arabic were the participant information sheets, the informed consent form, the interview guide and pre-notification letter, and the interview questions. The protocol documents were forward-backwards translated, but the interview transcripts were only forward-translated. The interview transcripts were translated from Arabic to English. In order to achieve a reliable and feasible translation technique, this study collaborated with three Saudi authorised translators (ST1, ST2, and ST3). The first two translators (ST1 and ST2) translated all qualitative protocol documents in a forward translation style, namely, from English to Arabic. The third translator then (ST3) translated the same qualitative protocol documents back into English. Finally, the researcher held a meeting between the three translators and an Arabic proof-reader. As a result, the committee agreed and reconciled the final version of all documents, including the interview guide (see Figure 4.4). With regards to the interview transcripts, I divided the transcripts into two groups, ten for each group, and sent them to the two primary translators (ST1 and ST2) in order to translate them from Arabic into English. Once all these steps were implemented, the researcher held a meeting

with the translators and confirmed and agreed upon the final translated versions. (See Figure 4.5)

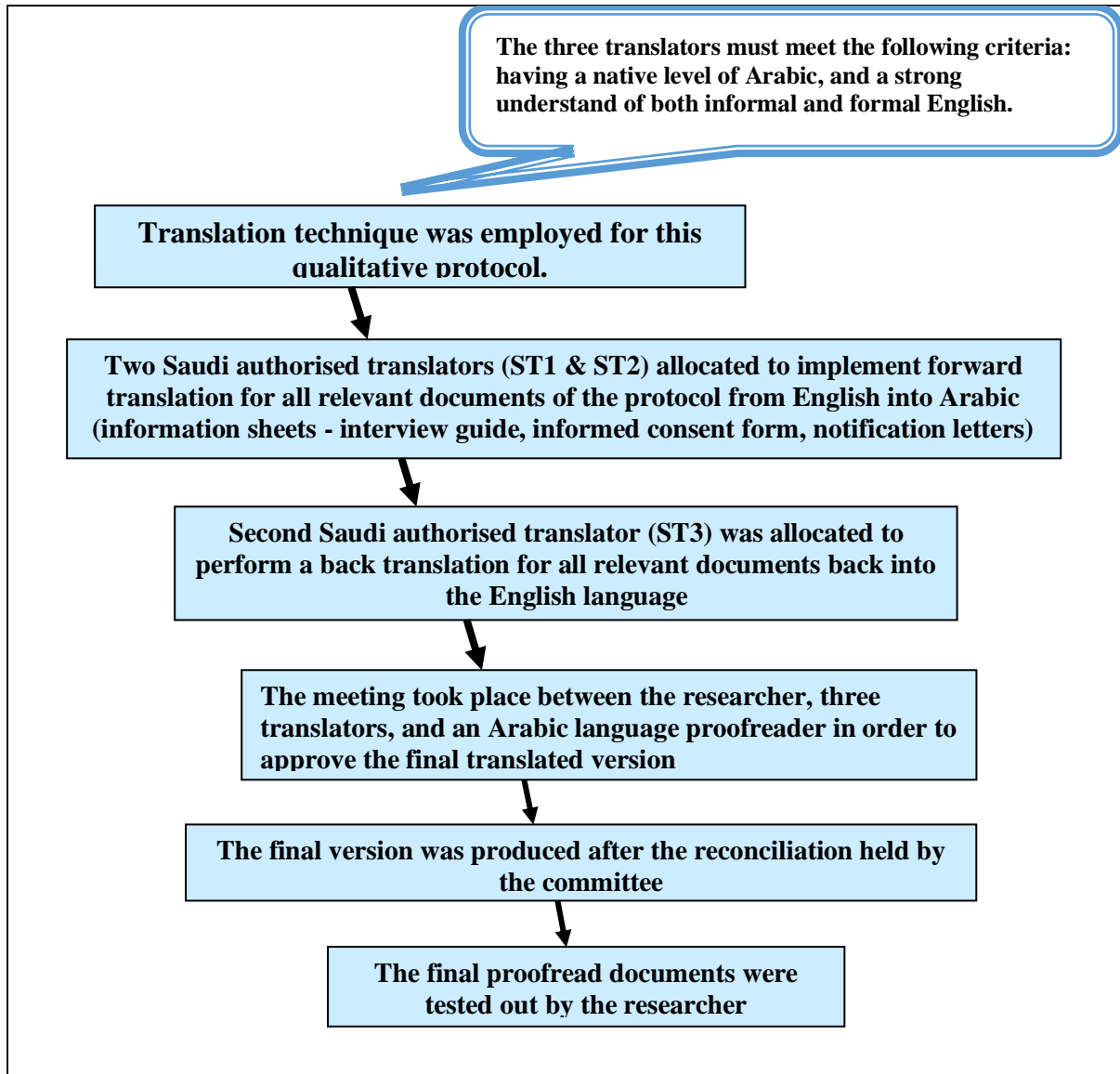


Figure 4-5 The Translation Process in the Qualitative Protocol

4.22 Ethical Considerations

This study took into account numerous ethical considerations in order to allow the study to become ethically suitable based on standard recommended ethical rules and regulations (Bryman, 2016; Ross, Iguchi, & Panicker, 2018; Wertheimer, 2014). Firstly, the study was granted ethical approval from the Saudi MoE and the University of Sheffield. The study

efficiently informed participants of the research and ensured that no harm would occur to them as a result of participation. In addition, the study also protected the identity of the participants by ensuring confidentiality; pseudonyms were created for the participants. Finally, this study has also fully informed the participants of the forthcoming thesis through both an informed information sheet and consent form (Bryman, 2016; Ross et al., 2018; Wertheimer, 2014).

4.23 Ethical Approval

One of the important steps keenly followed during the research was the submitting of an ethical application for consideration by the ethics committees previously mentioned. Gray (2018) insists it is important to ‘compose a proposal or research protocol’, which needs to be evaluated and validated by a relevant ethics committee (p. 82). As mentioned, the study has gained ethical approvals from the two following bodies:

1. The University of Sheffield Ethics Committee, Sheffield, UK.
2. Research Ethics Committee, MoE, Riyadh, Saudi Arabia.

Denscombe (2017) points out that ‘Approval from an Ethics Committee should be obtained before any primary data are collected from the people involved in the research’ (p. 338). This study followed this protocol, beginning its inquiry only after both approvals.

4.24 Informed Consent

Within this study, participants were provided with a fully detailed information sheet which consisted of all of the participants’ rights and the terms and conditions of participation; this was useful as it allowed the participants to have an idea of their impact on the research and the ease of their role. Furthermore, among the participants’ rights, the right to leave the study at any anytime was offered to the participants; the consent form also ensured that the participants acknowledged that participation was voluntary (Bryman, 2016; Fain, 2017; Kaewkungwal & Adams, 2019; Wiles et al., 2008).

4.24.1 Disclosure

This study provided each of the participants with an information booklet which contains the information sheet and the consent form. Furthermore, within the information sheet, the participants were provided with all of their roles, the terms and conditions of participating, and the impact they have had on the research, as well as how their information would be handled. Nevertheless, the information sheet mainly focused on encouraging the participants to feel that they would be welcomed in the study and valued and that their ethics would be thoroughly considered.

4.24.2 Understanding

After signing the consent form, this study ensured that every participant fully understood the study's nature and provided participants with the opportunity to ask any questions which might impact their decision to participate. Furthermore, this study also provided participants with the right to withdraw, meaning, more specifically, that they could withdraw without a given reason at any moment. Finally, in order to ensure that maximum understanding was achieved, this study utilised simple language within the information sheet provided to participants (Bryman, 2016; Clarke, O'Loughlin & Cashman, 2018; Kumar, 2019).

4.24.3 Volunteering

This research evaluated all ethical elements of involvement and ensured that the study was as simple as possible from an ethical standpoint (Clarke, O'Loughlin, & Cashman, 2018; Kumar, 2019).

4.24.4 Anonymity and Confidentiality

For the study to attain anonymity and confidentiality, all the participants must be fully aware that their information would be safe and that they would remain anonymous within the research (Clarke, O'Loughlin & Cashman, 2018; Kumar, 2019). Furthermore, in order to

ensure this, all hard copies of notes and recordings were kept in a safe within the researcher's home, to which only I had access. Similarly, any digital files were password-protected to keep the participant's identities safe.

4.25 Data Analysis for the Qualitative Approach

Computer-assisted qualitative data analysis software (CAQDAS) refers to the wide variety of textual analysis software, which is available, affordable, and feasible to support researchers in qualitative data analytic styles such as transcription, analysis, coding, and creating themes and subthemes (Bryman, 2016). Common software includes NVivo, MAXQDA, Quirkos, Qualtrics, and Raven's Eye. NVivo software has become popular among qualitative researchers for the analysis of textual data; it shall be discussed in the next section.

4.25.1 The Rationale for Selecting NVivo Software

NVivo software is an essential application in qualitative research (Gray, 2018). The tool is responsible for reducing the aspect of human error which occurs during different processes of data collection (Cohen et al., 2011). NVivo is recommended in cases where a researcher is required to deal with a large amount of data. In such cases, it becomes easy for the researcher to lose focus since, for example, the task of transcribing audio records is challenging and time-consuming. Researchers are encouraged to develop the understanding that NVivo software is a data management tool rather than a methodology for analysing the information obtained (Denscombe, 2017). Likewise, the primary aim of the tool should be a reduction of errors. Another strength of NVivo, according to Cassell and Symon (2004), is that it can aid the researcher in carrying out complex searches. The software also makes it possible for the researcher to retrieve operations during the management of data obtained from the transcription process. In some cases, the researcher may find it difficult while attempt to retrieve data, especially in situations where several files have been transcribed. However,

NVivo provides researchers with the opportunity of accessing the required information within a limited amount of time. NVivo is, therefore, essential software that is capable of improving the transcription of data obtained.

Furthermore, NVivo, in general, helps the researchers to catalogue parts of the text to specific themes. It additionally has effective tools to support the researcher in exploring probable associations among themes and subthemes (Cassell & Symon, 2004; Gray, 2018). This helps the researcher after processes like transcription, as it can be used to organise the data and highlight themes that might not be noticed otherwise. Accordingly, one of the factors which motivated this study to employ and apply the NVivo tool was its ability to sort through large amounts of qualitative data. The process of interpreting the data obtained became easier due to the application of the NVivo tool. Even though it is not capable of doing an analysis of data, its effective organising of the files enabled the researcher to conduct processes such as analysis of transcripts obtained from the interviews (Gray, 2018). Generally, it also allows one to revise themes which were applied during the research. Accordingly, the NVivo software was an effective tool to analyse all interview transcripts to obtain the qualitative study findings in the form of themes and subthemes, which enabled me to interpret the results and compare and contrast the findings with the findings of prior studies.

4.26 Procedures for Enhancing the Quality of Interview

The research implements three main techniques in order to enhance and obtain the desired outcome of the interviews and encourage the interviewee to elaborate upon their responses. Firstly, all interviews took place in a private and quiet room at each kindergarten to obtain a high-quality recording and avoid any distractions which might occur due to the neighbouring environment. Secondly, this study employed a high-quality voice recorder in order to effectively record the interviews. The use of an electronic recorder is considered to be the most effective recording method, as it allows researchers to keep precise records of verbal

interviews. This method should be encouraged among all researchers due to the accuracy it guarantees regarding the data obtained from the participants (Bloor & Wood, 2006). Therefore, the use of audio recorders has become a significant method to avoid skipping any form of information which may affect the relevance of the data recorded within a study (Orb et al., 2001). The use of the digital voice recorder also provided me with the opportunity to assess other factors during interviews, such as the comfort and confidence of the respondents. Remaining proactive on the ethical considerations of the interviews also allowed me to follow the required standards while collecting data within the study. I provided a detailed explanation of the ways through which the overall recoding would work. Describing the equipment which would be used helped ensure that all respondents were confident while participating in the research. Describing the recording tools which will be applied within the research is an effective procedure in that it enables the respondents to be comfortable (Hennink, 2014). I similarly made certain to give the respondents adequate time to decide on whether they were confident with the audio recorder. The provision of enough time for the participants prevented the factor participants from making inappropriate decisions. However, the participants were not affected by the audio recording method. Thirdly, apart from using the digital voice recorder, I also paid attention to the body language of the participants involved in the research. Remaining keen on this aspect enabled me to identify cases where the participants were uneasy while providing data. However, most of the respondents were comfortable—an aspect which simplified the overall process of recording information during interviews. As a result, I engaged in an ethic of care and respect when interacting with the participants. Finally, for the sake of anonymity, I have allocated anonymous codes for each interviewee and maintained participants' documents and recordings in a locked safe.

4.27 Thematic Analysis as the Data Analysis Technique

Numerous studies have shown that qualitative data analysis may be classified into the following six categories: analyses of content, narratives, discourses, frameworks, grounded theory, and themes (Bryman, 2016; Creswell & Poth, 2017). Thematic analysis is often recommended for studying any type of qualitative data (Bryman, 2016); hence, this study adopted and applied it as a technique.

4.27.1 The Rationale for Selected Thematic Analysis (TA)

Thematic Analysis (TA) is a significant technique used to analyse textual data by highlighting and identifying themes and subthemes. The technique is widely used in various sciences, for instance, social, behavioural, and applied sciences (Bryman, 2016; Creswell & Poth, 2017). The main strength of employing TA is that it is practically flexible and is workable for different research questions. It also lends to summation and code-creation, which can connect data to perceptions through experiences and views (Braun & Clarke, 2006; Bryman, 2016). Additionally, thematic analysis (TA) is primarily achieved by categorising data into six distinct stages in order to develop various significant patterns (Braun & Clarke, 2006; Bryman, 2016). Braun and Clarke (2006) define thematic analysis as having many levels. They define the six steps of thematic analysis as follows: becoming familiar with qualitative data, developing initial codes, looking for themes, evaluating themes, identifying ideas, and creating the report. This section, therefore, will outline processes undertaken during this study. The sections to come also discuss all these six-phase techniques comprehensively (see Figure 4.6)

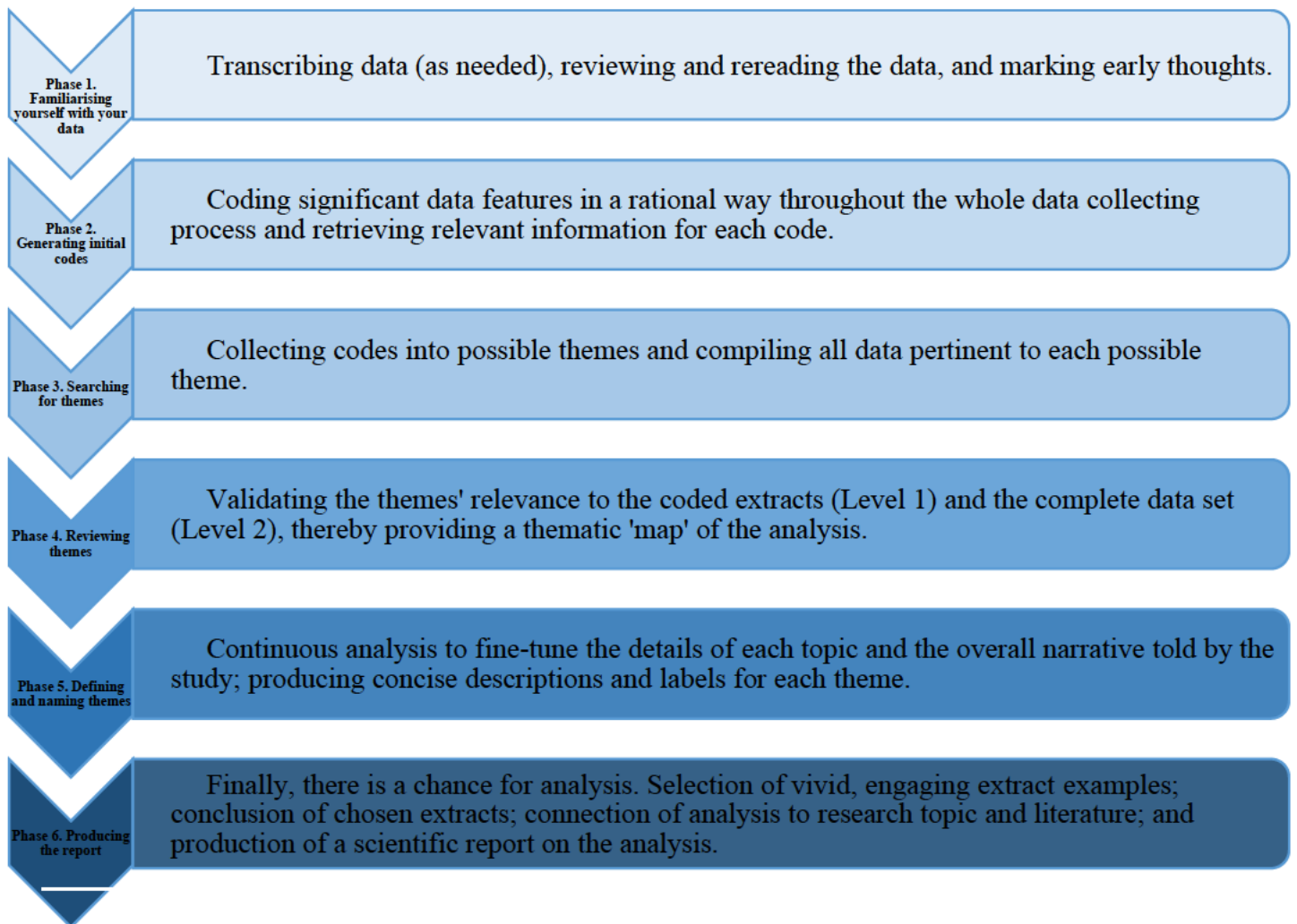


Figure 4-6 The Six Steps of the Thematic Analysis Technique

4.28 The Six Steps of the Thematic Analysis Technique

4.28.1 Familiarising Data

This subsection outlines the first step undertaken during the thematic analysis of the collected data in this study. This stage enabled me to read the information obtained from the participants. Reading the transcripts in detail allowed me to gain a deeper understanding of the topic, as it made reasoning with the thoughts of all participants involved in the research more

accessible. Wellington (2000) suggests engaging with the data involves the researcher's understanding of the overall sense of the collected data. Immersing myself with the data provided me with the opportunity of conducting other processes such as interpretation effectively. The stage of familiarisation remains the most important step in analysing qualitative data as it provides the researcher with an understanding of the emerging stories and concerns raised by the interviewees. Braun and Clarke (2006) emphasise the importance of this stage by asserting that transcription should not be considered a waste of time because of its duty of informing the initial stages of data analysis while providing further understanding of the collected data. In the present case, the step of familiarisation began during the interview, but familiarity with the data was best stimulated by replaying the interview recordings and reviewing each of the interview notes I had made earlier. Since most of the recordings needed transcription and later translation into English from Arabic, I had the opportunity to familiarise myself with the data at different stages. This provided a framework for identifying the emerging stories, themes, and issues with the participants' details.

4.28.2 Generating Initial Codes

This section describes the process of generating initial codes from the data. It outlines the significance of the step and explains how these codes were produced to aid in the identification of themes. Generating codes is the second step in thematic data analysis, and it is best achieved after familiarising with the data (Braun & Clarke, 2006). This step involved looking for similar words or phrases mentioned by the participants. Coding was a necessary step within the data analysis since it enabled me to develop essential patterns. The development of patterns within a research exercise is necessary, as it enables researchers to draw relevant conclusions. As discussed prior, the NVivo program was used to assign codes to segments of interview statements that describe ideas and concepts; this organises the interviews categorically. I thus used NVivo in coding the transcript from the interview into various topics

and ideas generated in the conversation. In the words of Miles and Huberman (1994), 'it is not the words themselves but their meaning that matters' (p. 56). A key consideration made while assigning these codes to the text was that all tasks should be based on the portrayed meaning rather than just similarity in words. This is the primary reason that taking first the step of data familiarisation was vital for generating the codes for the study. Therefore, this study utilised inductive reasoning for data analysis as the analysis relied upon the generated themes from the interview transcripts and the themes evident from the literature.

4.28.3 Searching for Themes

Based on the arguments made by Braun and Clarke (2006), generated codes should be organised into relevant themes, which can allow the researcher to gain a deeper understanding of the responses provided by participants. Coming up with the themes also enabled the researcher to understand the disparity which was present in the information provided by all participants involved in the research. This step was therefore essential since it provided a deep understanding of the beliefs of the participating kindergarten teachers. The process involved reading each paragraph in the code and identifying the background meaning and aligning it to the most appropriate theme. For instance, in this study, the third objective aimed to determine the factors that hinder kindergarten teachers from adopting technology in their teaching duties. While interviewing the teachers, some factors would be stated forthrightly; instead, they intertwined within the conversation, and it requires aspects of insight to identify the factors. Therefore, I had to consider the research questions while reading the coded text. Lastly, I have previously worked as a lecturer and understand the challenges that teachers face while undergoing a transition in their practice. Therefore, my experiences in the teaching profession equally aided me in identifying these silent themes cited by the interviewees in the transcripts. One teacher may cite the lack of computers in her school setup; the other may mention poor electricity connection; while others may state there is the availability of only one computer

used by the school secretary. Despite the three indicating different points, they all fall under one theme: that of inaccessibility to machines as a hindering factor in using technology in kindergarten education. Therefore, the above-described process is what was achieved in this stage of thematic analysis of qualitative data in my study.

4.28.4 Review of the Themes

According to Braun and Clarke (2006), this stage aims to further define the identified themes and confirm their coherence with the extracted text from the codes. The stage, therefore, compares the themes with the raw data to establish similarity and reclassify those themes that do not fit into the coding system. At this stage, I read the coded text and the original scripts to pin identified subjects to the original version. Points that did not fit into the coding system required either reclassification or recoding of the section. The entire coding process often becomes difficult, especially when two apparently correct themes contradict each other. However, considering the subjective nature of the gathered information, most of these different concepts were retained as they show different views by the different participants. The coding process may be extensive; therefore, as Braun and Clarke (2006) have warned, investigators should appreciate the appropriate extent of coding while maintaining the quality of the information.

4.28.5 Definition and Naming of the Themes

Braun and Clarke (2006) have stated that the fifth stage of thematic analysis begins after attaining thematic maps and involves clarification of the identified themes that would be forwarded for final investigation. According to Auerbach and Silverstein (2003), the naming of the themes should be understandable and should express a succinct message. These names should portray the contextual meaning characterised by the themes to ensure that no information is misaligned. In this study, I defined all the identified themes with the most

appropriate phrases. I also attempted to keep the themes brief and precise to avoid confusion and loss of the original information.

4.28.6 Generation of the Report

The compilation of the report is the final stage of thematic data analysis. Braun and Clarke (2006) describe the process as the researcher picking the most descriptive and compelling extracts from the data and matching the extracts with the research questions or discoveries made from the literature review. Therefore, in this phase of thematic analysis, I selected themes related to some areas, such as educational background and linked them with the research questions. For instance, the study demonstrated that educational background might be contributing to the unwillingness to implement technology in the education of kindergarten children. Therefore, my theme, in this case, remained tied to the third research question, which was aimed at determining factors inhibiting the adoption of technology by kindergarten teachers in their teaching. A similar procedure was repeated with other research questions and literature reviews to find the link between the generated themes and the literature and the research questions. Providing a conclusion, according to Braun and Clarke (2006), is the final stage of data analysis. It involves the provision of a well-written account of the data analysed through different processes, such as transcription and the use of NVivo software. I focused on this stage by organising all relevant information, including the themes developed within the study. Performing this process effectively led to a trustworthy interpretation of the data.

4.29 Applying Braun and Clark's Framework in this Study

Because there are a variety of methods for carrying out thematic analysis (TA), each of which is predicated on a unique set of philosophical assumptions and implements a special combination of operational practises, the qualitative research that is published and uses TA is laden with discrepancies (Braun and Clarke 2019). Thematic analysis is an approach for

detecting, analysing, and reporting themes (Braun and Clarke, 2013). It may be used with other qualitative methods and is not constrained by any theoretical framework or methodology requirements (Braun, Clarke, and Weate, 2016; Braun and Clarke, 2006). Thematic analysis is a favoured qualitative research method due to its adaptable nature, but it is not immune to criticisms such as the perception that it is a "free-for-all" method (Braun & Clarke, 2006). While thematic analysis is acknowledged as a capable method of producing comprehensive and reliable qualitative findings in various scholarly fields, there are concerns regarding its execution. These concerns revolve around the lack of uniformity and coherence within and across different approaches and the presence of philosophical ambiguity, such as the inability to contextualize thematic analysis with regard to underlying assumptions (Braun, Clarke, & Weate, 2016).

While numerous studies employ thematic analysis as a method, there is much heterogeneity in how it is used, presented, and conceptually positioned. Two issues resulted: the first is that thematic analysis is a variety of approaches with certain shared assumptions and practices. However, it is a challenge for researchers to make clear the approach used to thematic analysis, and to elucidate the relationship between data analysis and the findings. Braun and Clarke (2020) point out that one of the key issues in thematic analysis is how the researcher actively engages with the data, including their paradigmatic foundations, the approach to coding (i.e., latent/semantic or deductive), and other methodological choices. Similarly, Braun, Clarke, and Weate (2016) highlight the importance of the researcher's approach to thematic analysis, as different approaches may result in varying levels of consistency and coherence within and between studies. The reader cannot assess, compare, or synthesise research if they cannot identify the approach to thematic analysis, how it was done, or the assumptions behind it (Attride-Stirling, 2001). By making these processes transparent, researchers can benefit from the experiences of others and work together to improve qualitative research methods.

Braun and Clarke's thematic analysis is prominent in education research (Braun and Clarke, 2006). Based on the assumption of an engaged and self-reflexive researcher, the thematic analysis framework is established (Braun and Clarke, 2019). Braun and Clarke (2019) "consolidated" the method as "reflexive thematic analysis" to emphasise that it needs to be used by a reflexive practitioner or researcher. Braun and Clarke (2019) emphasise that thematic analysis requires a researcher to understand its philosophical perspective and theoretical assumptions. Reflexive thematic analysis requires a qualitative paradigm, subjectivity, recursive coding, and constant reflection. For a successful reflexive thematic analysis, it is essential for the researcher to engage reflectively and attentively with both the data and the analytic process (Braun and Clarke, 2019). Braun and Clarke argue that thematic analysis must be based on a self-reflective methodology. However, questions remain about how deeply researchers should interact with and report on reflexivity.

In the following sections, I draw on my audit trail to illustrate the range of thoughts I had and the deliberate choices I made while I conducted my analysis. I also explained how I employed reflexivity to produce diverse interpretations that helped me comprehend the data and created rigorous qualitative research. Finally, documenting reflexive thematic analysis is challenging (see Appendix 3.1 B).

The analysis is a proactive procedure, not inherent in the data (Braun, Clarke, and Weate, 2016). Braun and Clarke (2019) offer a six-stage process for carrying out reflexive thematic analysis, but they underscore that the analysis is not a straightforward, sequential process, and it often entails moving back and forth between phases. Reflexive thematic analysis begins with data familiarisation (Clarke and Braun, 2016). To familiarise myself with the data, I listened to all the interviews twice and transcribed the 20 interviews verbatim. After that, I allocated Saudi legal translators to implement the back-forward translation technique to

translate 20 interview transcripts from Arabic into English. Finally, I held a meeting with the translators so that they agreed and reconciled the final version of the 20 revised translated transcripts. That process assisted me in order to familiarise the transcripts. Then, I went back and read the transcripts of all of the interviews, so that I could have a better understanding of the data. Afterwards, I re-examined each transcript of the interviews and engaged actively in the process by contemplating various meanings and connections and noting them down as reflective annotations. I understood the interviews better after data familiarisation.

When it reached the start of the coding process, I was a little hesitant. I assume this was because I was concerned that I would not perform it correctly or that the result would not have been satisfactory. I concluded that I only needed to get started somehow, mainly because I understood that this would be a logical progression forward and backwards and that I would always be able to return to the point in the analysis where I had begun. After reading the first two interviews twice, I began coding the first interview while simultaneously making analytical notes in the margins of the document. These notes included items for further consideration and questions for myself.

I immediately started to code the second interview. The next day, I went on to the second interview, during which I repeated the process, but this time I added more specificity to my codes. I believe that I performed a more effective job during the second interview as I went beyond the surface-level reading of the words on the transcript. This enabled me to better connect with the content and participants' meanings in the interviews. Having the information in front of me, similar to a chronology, helped me immensely in the form of a chronology of the presented information.

Phase two involves producing codes—semantic and latent, inductive labelling of a raw data segment that may be related to research concerns (Braun, Clarke, and Weate, 2016). The development of themes is underpinned by the codes, which serve as both the fundamental

elements of analysis (Braun and Clarke, 2013) and the building blocks of analysis (Braun, Clarke, and Weate, 2016). The data drove the inductive coding process, consistent with the inductive methodology used for data analysis. Manually coding data on printed paper transcripts seemed most feasible to me (for me). I selected one interview at a time and devised basic semantic codes that underlined the most obvious meanings in the participant's words. I used the reflective narrative text to contextualise and add notes to a transcript of the interview. I added further crucial comments in the margins to attempt to continue processing and perceiving the information provided in the interviews. These comments frequently included speculations, potentially underlining meanings, similarities between interviewees, queries, or topics to explore.

I aimed to preserve the context of the data during the coding process and believed that fragmenting the data could result in a loss of context. Understanding the beliefs of kindergarten teachers regarding technology in education and how these beliefs influence the use of educational technology in classrooms was essential to me. To address this, I would construct case files for each participant, documenting teachers' beliefs about applying technology to teaching kindergarten children and their pedagogical roles and behaviours while using technology. I also confirmed the interview's "main" themes in each transcript.

As I proceeded through the interviews, I understood the process better and began coding semantically and latently. I paid attention to the language used to express specific ideas since this is just as crucial as directly expressed information (Smith and Sparkes, 2009). I observed silences, realisations, and other non-verbal signs during transcription and field notes. The original coding considered these events. As I progressed through coding the interviews, accordingly, I went back and forth between these interviews in a process of writing notes on the interview I had just completed coding, and the interview I had just finished coding before it. After conducting the third interview, I noticed that I could reduce the amount of coding

required and focus on answering my research questions. Upon reviewing the transcripts from the initial stage of coding and reading them over, I realised that they were excessively coded and disorganised, with additional notes. Next, I reprinted all the transcripts and coded them all over again, reviewing the results of my first attempt (e.g., transcript one first and second rounds of coding).

I followed Braun and Clarke's (2013) recommendation that "excellent" codes are those that capture the fundamental nature of the information that piques the researchers' interest and are detailed enough to encapsulate the content of the data. As such, I intended to use this second attempt at coding to review my notes, improve my process, and improve the accuracy of my codes. Consequently, before the start I went over all the notes and wrote some analytical notes that would later assist me in my second coding round. I tried to ask better data queries and integrate my prior knowledge with them. As an early childhood development expert who worked with children up to 5 years old, I was interested in researching using technology in preschool-kindergarten children. As a researcher, I went into coding with an attitude of 'conscious curiosity,' asking myself questions like "What is the significance of contextual information in shaping teachers' ideas about technology integration in early childhood education?" and "How can I establish a connection between the available data and incorporate it into the category of 'currently known,' while also comprehending the significance of the 'unknown' data that lies outside the confines of this category?" This step allowed me to narrow down my original set of codes, pick out the codes that pertained to my research questions, and go even further into the text. As a result of these processes, I believed I understood the data and saw comparable codes in different transcripts. According to Braun, Clarke, and Weate (2016), there is no fixed endpoint or optimal number of codes in the process of coding qualitative data, and researchers strive to develop a set of codes that effectively captures the analytically relevant features of their dataset. In addition to conducting interviews, the researcher also created case

files for each participant, which contained essential demographic information as well as the initial themes that emerged from the interviews.

In the end, I decided to print off fresh copies of all of my transcripts. To finish the second coding round, I went through each transcript in order, working my way through them individually. The procedure was as follows: Next to my recently printed transcript, I kept the one from the first coding round. In the end, I had to reprint all of my transcripts. A second phase of coding required me to go over each transcript manually. The procedure was as follows: I placed the previously coded transcript (from the first round) next to the newly printed and unmarked transcript; I reviewed the previously coded transcript and made an effort to clarify and simplify the codes; finally, I recorded the revised codes in the newly printed transcript. I underlined key sections of each updated transcript to make it easier to find relevant evidence to write the narrative of the findings. Finally, as I processed the data, I felt like I was an active participant in the analysis instead of a passive observer.

I also wrote down crucial points that came to me while working through the interviews, such as possible themes, linkages, and more profound thoughts about what could be happening underneath the surface. This was going well. After the second coding round, I was still unsure how to proceed. My interview codes were written, but I didn't know how to analyse them. I worried about moving from codes to themes and interpretative analysis.

I was apprehensive about how to analyse through Nvivo. Nvivo was more likely to lose context during analysis, which was my main worry. Since I preferred manual to electronic, I knew working manually was best for me. Subsequently, I opted to create a distinct Word document for each transcript, where I listed all the codes from the corresponding interview and extracted all the data segments that corresponded with those codes. For each transcript, I would follow these steps. After this, I would establish a master code list containing codes. It was

crucial for me to ensure that the codes were being utilised effectively to construct themes and that analysis progressed beyond merely a descriptive level to an interpretive level.

Subsequently, I felt prepared to review all the codes, and following a discussion with some colleagues regarding their methods and selecting the ones that resonated with me, I attained a more lucid comprehension of how to proceed. Braun and Clarke (2013) suggested that researchers must collect together all text occurrences where that code occurs in the data set for each code. I generated a Word document for each transcript and typed down all the codes (condensing “like” codes) and data extracts that matched that code. Each transcript performed this process (20 documents total). 20–30 codes per interview.

I colour-coded themes and subthemes and created a document with all relevant data extracts, thereby creating an interview code with corresponding data extracts. For instance: when I created the main theme ‘Technology is widely available’, I was hesitant about how I can generate the subthemes to select the proper citation from the interview transcript and place it under the relevant themes to organise my work. As a result, I created the following subthemes ‘Technology is accessible in most households’: ‘Technology is useful’, and I selected the applicable citation to verify my arguments. For instance, I selected the following extract and put under the subtheme ‘Technology is useful’:

I feel comfortable when I use the projector because I know that children can receive and understand the information regarding the lesson and will be able to visualise it, making it both time-efficient and effective to use.

Another citation was selected and placed under the relevant subtheme: Technology is accessible in most households.

I consider technology important, so I use it with the children I teach. In our school, we use technology to teach the children. It helps me a lot and allows the children to use their experience with technology at home to learn in school.

If I had not actively engaged during the thematic analysis process, I may have still developed themes, but they would have lacked interpretative depth and been more descriptive in nature. Furthermore, they may not have adequately represented the complete data set, and could have been more inclusive of domain summaries. Performing TA in a way that is both reflexive and transparent may be difficult and time-demanding, but facing these challenges is essential if we want to bring the quality of our findings to a higher level. Understanding one's perspective, one's connection with the data, and one's part in the creation of knowledge may provide substantial additional insights.

4.30 Pilot Study

Carrying out a pilot study is an effective stage that should take place before implementing large studies or their surveys, as it is considered an effective key to identifying any risks or hazards the researchers might face when embarking on the main studies (see Bryman, 2016). According to Teijlingen et al. (2001), a well-designed pilot study makes it possible to gain the required details regarding the research process and the likely outcomes. Examining the inadequacies of research before conducting the study is also a relevant step that makes it possible to improve the design. The present study has aligned itself with the above suggestions and those from scholars in the methodology field in order to determine any challenges in the fieldwork that I might encounter. As a result, this study was piloted for many reasons, which are justified and explained in detail in the following sections.

4.30.1 The Justification for Conducting a Pilot Study

1. To evaluate the feasibility of the proposed qualitative research protocol.
2. To explore the challenge, risk, and hazards surrounding the environment of the fieldwork in order to improve the effectiveness of the research outcome.
3. To emulate the practicality of the selected sampling method.
4. To evaluate the feasibility of the interview guidelines.
5. To practice transcribing the interview and pilot the proposed forward-backwards translation technique.
6. To pilot and practise how to conduct an effective interview and test all relative themes.

4.30.1.1 Lessons Learned from Conducting the Pilot Study

The pilot study provided numerous lessons that have enabled the researcher to minimise any challenges and increase the expectation of the feasibility of the proposed protocol to address the three research questions for this study.

4.30.1.2 Recruitment Process and Evaluation of the Environment

This study used the purposeful sampling technique in the form of the whole population of kindergarten teachers within the five selected kindergartens in Riyadh city. The pilot study revealed that it would be possible to recruit teachers as participants after this study would be approved by the MoE and other ethical approvals were achieved, as well as permission from headteachers at each of the five kindergartens. I initiated dialogues with teachers at one of the kindergartens about the forthcoming study, and they were keen to take part in the study.

4.30.2 Testing of the Interview Guidelines

The pilot study was successful in testing the questions of the interview guidelines and found that the questions were stated clearly and understandable and that the interviewee could answer them without asking for further clarifications or explanations.

4.30.3 Conducting Interviews and Generating Themes

For this research, I recruited three teachers for a pilot study to assess all steps of the proposed protocol of the interview session. This pilot study provided a successful outcome, with the interviews being implemented and recorded effortlessly. In addition, the researcher acted as a transcriber who carried out the interview transcription before sending these transcriptions off for translation. The translation process was performed within five days for each transcript, which was another effective outcome.

4.31 Verification of Qualitative Findings

Numerous approaches have been utilised to verify and enhance the trustworthiness of qualitative findings, which include four main components: dependability, credibility, transferability, and confirmability. One suggestion for the verification of qualitative findings has been that a novice researcher should allocate one or two experienced researchers to review all processes of the stages of creating themes up until gaining the final results (Burnard et al., 2008). Other researchers strongly support the claim that the principal researcher who is undertaking the study is entitled to be an expert in their own study due to their familiarity with the data, and since they act as interviewer or transcriber who completes the data analysis—this holds so long as the main researcher reflects upon their own potential biases (Bryman, 2016). Accordingly, being the interviewer and transcriber and having familiarised me with the data, I have reflected upon my potential biases. Finally, this study has implemented the forward-backwards translation technique for all documents related to this qualitative approach, including all interview transcripts, which were examined by two registered translators, who agreed on the data trustworthiness and verifications.

4.32 The Challenges of this Study

Doubtless, this study, similar to other primary research, has faced numerous challenges, whether they were during the fieldwork data collection or during the data analysis. With this study having successfully recruited Saudi kindergarten teachers from five different districts in Riyadh, travel was one challenge for both recruiting and communicating with teachers. Travelling long distances naturally incurred high costs out of my own limited budget. On another matter, interviews were sometimes obstructed by the limited availability of a participant or a teacher feeling unwell and requesting a schedule change. The solution for minimising these challenges was indeed to simply reschedule the interviews.

With regards to the data analysis technique, I collected large amounts of data that needed to be transcribed and then translated into English before I could create the theme. These tasks required effort and were thus naturally time constrained. To reduce these challenges, I allocated two translators in order to translate all interview transcripts from Arabic into English. In addition, this study sought and obtained the view of an expert to review the themes in order to evaluate whether they were appropriately related to the research questions and thereby reduce the natural biases that might be produced by the researcher.

4.33 Study Time Plan

For the study's time plan, please see Appendix 3.6.

4.34 Summary

This chapter has outlined all themes related to the methodology and research design that was employed to address the three qualitative research questions. In addition, I have herein discussed the constructivism paradigm, which shaped all components related to the methodology. Furthermore, I have described and justified in detail the target population, the sampling technique, and the research design. I have also explained the forward-backwards

translation technique employed in the study, as well as discussed all ethical aspects. Finally, in this chapter, I have addressed the reason behind carrying out a pilot study and the lessons learned from the said study and have also provided details on various data analysis techniques which were later employed within this research. In the following chapter, I present the findings obtained from analysing the qualitative data.

5 Chapter Five: Qualitative Study Findings

5.1 Overview

The first four chapters of this thesis have discussed the existing literature on teachers' beliefs regarding the use of technology to enhance children's learning. In this chapter, the study findings are presented and discussed. The research questions are, "What are the beliefs of kindergarten teachers regarding the use of technology with children in Saudi Arabia?" "What are the factors influencing the beliefs of kindergarten teachers on the use of technology for educating children in Saudi Arabia?" "What are the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children from kindergarten teachers' perspectives in Saudi Arabia?" To address these research questions, interviews with 20 Saudi teachers were conducted, from which various themes were extracted from the data analysis. Of these, there were five main themes that were crucial for comparing and contrasting the data obtained from the interviews.

5.2 Demographic Data of the Study Participants

As shown in Table 5.1, 20 female kindergarten teachers from five different regions in Saudi Arabia were interviewed over a period of two months. Their years of teaching experience varied from three to seven. To maintain the anonymity of the study participants, they will be referred to in this paper using unique labels (e.g., P1, standing for 'participant 1').

Table 5-1 Demographics of the Study Participants

No.	Interviewee	Gender	Teaching Experience	Interview Date	District of the Kindergarten in Riyadh
1	P1	Female	5 years	20/01/2019	East
2	P2	Female	6 years	23/01/2019	East
3	P3	Female	5 years	24/01/2019	East
4	P4	Female	8 years	28/01/2019	East
5	P5	Female	6 years	30/01/2019	West
6	P6	Female	4 years	04/02/2019	West
7	P7	Female	3 years	06/02/2019	West
8	P8	Female	6 years	11/02/2019	West
9	P9	Female	5 years	13/02/2019	North
10	P10	Female	6years	18/02/2019	North
11	P11	Female	5 years	20/02/2019	North
12	P12	Female	6 years	25/02/2019	North
13	P13	Female	7 years	27/02/2019	South
14	P14	Female	5 years	04/03/2019	South
15	P15	Female	3 years	06/03/2019	South
16	P16	Female	3 years	10/03/2019	South
17	P17	Female	6 years	12/03/2019	Central
18	P18	Female	4 years	14/03/2019	Central
19	P19	Female	3 years	18/03/2019	Central
20	P20	Female	3 Years	20/03/2019	Central

5.3 Findings of the Qualitative Research

Ajzen's Theory of Planned Behaviour (TPB) is used to identify instructors' views in order to conduct a full investigation of their beliefs. Behavioural beliefs, normative beliefs, and control beliefs are the three types of beliefs that affect human behaviour according to the TPB developed by Ajzen (1991). These beliefs determine an individual's intents and are classified as follows: behavioural beliefs, normative beliefs, control beliefs (Ajzen, 1991). According to Ajzen (1991), behavioural beliefs are types of beliefs that are formed by linking attitudes of a given object with a particular object's action. Behavioural beliefs, according to Underwood (2012), originate from an individual's personal associations with the effects of their actions. Although an individual's own positive or negative appraisal of various behaviours may be reflected in their own positive or negative evaluation of those behaviours, each individual has a unique viewpoint on whether they have a favourable or unfavourable attitude toward particular behaviours.

The second concept is normative beliefs, defined by Ajzen (1991), as perceived social pressure to engage in a given activity or refrain from engaging in a specific action. Furthermore, according to Underwood (2012), a person's incentive to comply with a subjective notion of social pressure is reflected in the subjective norm. Control beliefs - the conviction in one's ability to affect one's environment is the third concept of TPB. In accordance with Ajzen (1991), control beliefs are a collection of beliefs that deal with the availability or absence of necessary resources and opportunities that may be retrieved from previous experience or second-hand knowledge about the experience associated with the activity. According to Underwood (2012), the existence or absence of certain elements that may help or hinder the adoption of a specific behaviour is at the heart of control beliefs. As Ajzen points out, the degree of perceived behavioural control associated with control beliefs relates to the perceived ease or difficulty of completing the activity, depending on how it is thought to be.

According to the Theory of Planned Behaviour (TPB) framework proposed by Ajzen (1991), behavioural beliefs depict beliefs related to specific consequences and outcomes; normative beliefs depict beliefs related to specific expectations held by someone; and control beliefs depict factors and opportunities to perform specific conditions. The information obtained from the semi-structured interviews in this research reveals specific examinations of kindergarten teachers' perspectives about facilitators and obstacles while using technology in the classroom to educate children.

As the thematic analysis method was used in the analysis of the data obtained from the interviews with 20 teachers, various themes, subthemes, and sub-subthemes were identified through the analytical processes described in Chapter 4. This allowed the data obtained to be effectively grouped so that the research questions of the study could be answered based on such data.

5.3.1 The Main Themes, Subthemes, and Sub-Subthemes

Table 5.2 presents the five main themes, 11 subthemes, and 26 sub-subthemes identified from the interview data. These main themes, subthemes, and sub-subthemes will be discussed in the upcoming sections, and direct quotes from the interviews will be cited. The quotes were chosen as they align with the corresponding theme, meaning important insights could be gleaned from teachers' perspectives.

Table 5-2 The main themes, subthemes and sub-sub themes extracted from the interviews

Main Theme	Subtheme	Sub-Subtheme
<u>Teachers' behavioural Beliefs</u> 1. Technology can enhance learning. (Q1)	Use of technology in the classroom setting	Compatibility with lessons,
		Ease of learning, Teacher support
	Technology is the future	Jobs require technology,
		Evolution of technology, Technology as being important for the upcoming generation
Improving children's technological skills	Learning technology use early, Improved learning	
<u>Control Beliefs</u> 2. Technology is a barrier to education (Q3)	Technology offers distractions	Technology distracts children from learning,
		Technology distracts teachers from teaching
	Technology use is less effective than traditional teaching in making children learn	Teachers have more impact than technology,
		Traditional teaching is more beneficial, Technology has negative effects on children and their learning
Teaching children in the traditional ensures engagement of children is higher	Technology cannot give direct answers, Technology is confusing to use	
<u>Normative Beliefs</u> 3. Technology is widely available (Q2)	Technology is accessible in most households	Children have experience in technology use,
		Technology is useful, Parents can monitor their children's learning

Main Theme	Subtheme	Sub-Subtheme
<u>Teachers' behavioural Beliefs</u>	Technology makes it easier for teachers to plan their lessons	Technology makes it possible to plan lessons at home,
		Technology use for lesson planning is time-efficient
4. Technology supports teachers (Q2+Q3)	Importance of further education for teachers	Teachers must be trained in using technology in the classroom,
		Teachers being more comfortable with technology
<u>Normative Beliefs</u>	Home learning	Additional learning,
		Fun learning tasks
5. Parents should be involved in their children's learning (Q1)	Support from home	Training parents to teach their children from home,
		Additional teacher sessions at home

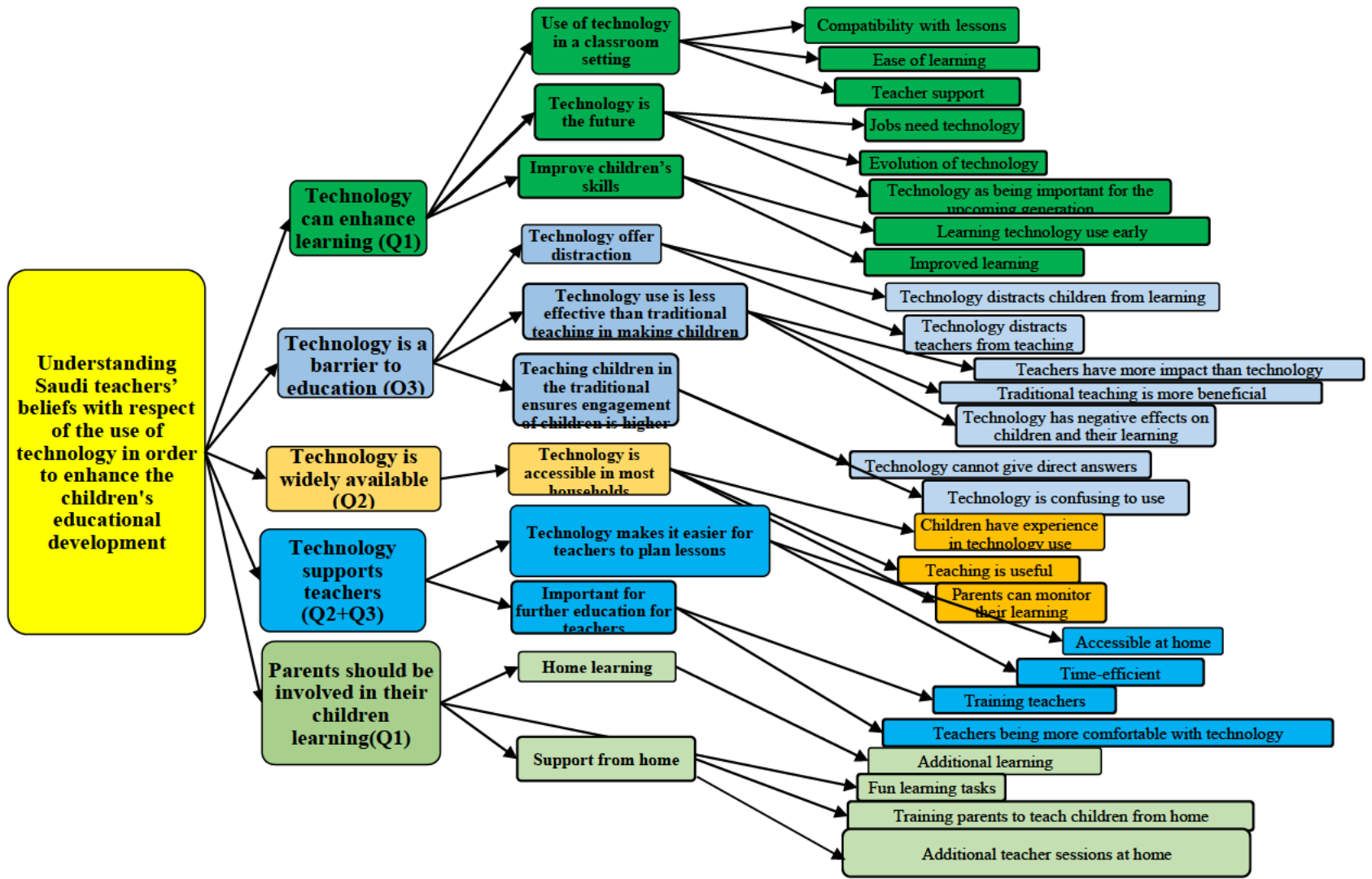


Figure 5.1 – The five main themes elicited from the interviews along with the various subthemes and sub-sub themes.

5.4 Behavioural Beliefs

Behavioural beliefs are specific beliefs that indicate attitudes that lead to positive results (Underwood, 2012). According to the findings of the interviews, certain kindergarten teachers' behavioural ideas about facilitators and obstacles when using technology in their classrooms were identified and discussed. The findings revealed that the most often given responses were those regarding the kindergarten teachers' beliefs about facilitators and obstacles when using technology in the classroom to educate children. The next section focuses on Teachers' behavioural beliefs about Technology can enhance learning. (Q1) and Technology supports teachers (Q2+Q3).

5.4.1 Main theme 1: Technology can Enhance Learning (Q1)

This main theme has three main subthemes: (i) the use of technology in a classroom setting (compatibility with lessons, ease of learning, and teacher support); (ii) technology is the future (jobs require technology, the evolution of technology, usefulness in later education), and (iii) improving children's technological skills (learning technology use early, improved learning). These will be discussed in the following sections.

Subtheme 1: Use of technology in the classroom setting. The use of technology in the classroom setting was discussed by most of the teachers. Falling under this subtheme are the following sub-subthemes: compatibility with lessons, ease of learning, and teacher support.

Sub-subtheme 1: Compatibility with lessons. Technology is continuously evolving, and it has been adopted in many ways in the classroom setting to enhance student learning. Most of the teachers stressed the importance of technology in the classroom and outlined how it could be useful for their lessons and how it allows for the further development of their pupils. The following are some of the interviewees' thoughts on this matter:

If I had a choice, I would allow technology to become part of my lessons as it's a significant tool for teachers and as it's becoming increasingly suitable for use in lessons because of new applications, websites and resources that improve the children's knowledge and skills. [P1, east region]

I've seen many other teachers on social media showing technologies available in their schools, and from what I've seen, technology can be suitable for lessons only if used correctly; otherwise, it may pose a challenge to children's learning. [P19, central region]

Similarly, it was also argued that:

Technology can improve children's reading skills by projecting stories on the screen and can also develop children's math skills by providing various activities that also help develop children's mental skills. The children's writing skills, however, cannot be developed by technology devices; the children need to hold a pen and practice writing in the traditional way. [P20, central region]

Several studies have highlighted that technology use in education, as an efficient and effective educational instrument, has produced many positive outcomes (Abouelnaga et al., 2019; Al Mulhim, 2014). The advantage of technology is that regardless of geographical situations, times, or distributors, it is a versatile way to provide online education. It offers the capacity to dynamically and instantly provide both learning and information at will. However, most education settings significantly lack the ability to provide sufficient facilities in order to reap the full benefits of utilising technology. In alignment with this, it was argued that:

I think technology is already very compatible with lessons, but the school should provide us with workshops to train us and should provide numerous learning applications and games within class devices. Also, I think the school should provide internet connection in the classrooms rather than just in the Computer Room so that the children can access the materials directly from their devices instead of having to download the materials from home and then transferring these to the class computer and then displaying these aspects in the class, which takes a long time and is a waste of precious time. [P10, north region]

I wish the school would provide an iPad that we could use to help less able children with their writing. For example, I could put the iPad in my classroom's Science or Story Corner and then connect it to my computer so that the children could see the pictures on my computer that match the lesson I'm teaching them. This would make it easier for them to learn as they're watching how to do something while they're doing it. I also need a computer because the one I have now is slow. [P12, north region]

Alternatively in some cases, sufficient facilities were provided to the students, and one kindergarten has seen benefits from utilising this technology as it made the learning process more adaptable and suitable for students:

The school administration is already providing support to the teachers regarding technology use by offering us internet on all the computers in the school and connecting the computers to one server in the administration office. It's like a system connecting all the computers. This system allows us to access all the students' files when they log

in to their computers in the Computer Room and allows us to adapt the lessons. So I would say that the school is doing well in the area of compatibility. [P17, central region]

It has been suggested by researchers that compatibility should be ensured schoolwide if there is to be technological advancement (Abir, 2019). Furthermore, improvement should be seen in the teachers' relevant skill sets (Abir, 2019; Abouelnaga et al., 2019; Al Mulhim, 2014). The main reason is that with such improvements in teachers' relevant skill sets, the teachers will know how to engage with their pupils and will be able to more effectively explain concepts to them via the technology being used (Al-Joudi, 2000; Al-Omar, 2013). Therefore, ensuring that the equipment used is compatible with classroom learning can increase the effectiveness of technology in the classroom.

Sub-subtheme 2: Ease of learning. As technology is evolving rapidly, it can be argued that it allows learning to become easier and more effective (Alotaibi & Almalki, 2016; Alqassem et al., 2016). In fact, there are already software programs specific to each subject. This view was expressed by 18 of the 20 teachers who were interviewed in this study. The following are some examples of the views that were shared in this regard.

Learning is a complex process, and I believe that if technology is used to its full current potential, the younger generation will turn out to be more knowledgeable. Also, I believe that if technology is integrated into people's lives at such a young age, they can look forward to a better future. [P11, north region]

Using technological devices in the classroom helps children a lot. For instance, I can show the children a video featuring different movements, such as sports movements, and all that the children need to do is copy the movements. [P2, east region]

Accordingly, technology engages students through interest and motivation, offering opportunities for active participation and learning. But consistent involvement is the basis for optimal success. The rapidly evolving nature of education may lead to the complete integration of technology into the education system (Al-Rashed, 2002; Al-shaer, 2007). Technology, therefore, is used as a way of making sure students are provided with their education. As a result, it was argued that:

Technology can be utilised in education as it is an effective way to simplify learning in the classroom for all students. For instance, when we do science experiments, we can project practical experiment methods on the screen, and the children can just follow them. Homework has also started to be relayed to the children online, which both decreases paper use and simplifies the process of assigning homework. [P14, south region]

It was also argued that technology provides ease of access and allows children to learn more effectively and accomplish more even away from school. As a result, it was suggested that:

We have a school website where I upload the daily lessons and activities that can help the children learn what they're supposed to learn. Also, through such a website, I can let the parents know what their children are learning every day so they can keep in

touch with the school and monitor their children's progress. In this way, technology has made it easier for me to make the children learn. On the part of the children, technology has made it easier for them to learn even at home, so even when they're ill or absent, they will have access to all the tasks that they need to accomplish and to materials that they can effectively use to learn. [P8, west region]

According to Aljabreen and Lash (2016), the use of technology in kindergarten classrooms in Saudi Arabia has changed the learning environment for children. Technology helps motivate kindergarten children to learn and facilitates their learning with the use of modern teaching methods, thus enhancing their progress. However, it was argued by a teacher in this study that even if technology can be used for teaching, learning directly from a teacher is much easier as the children cannot ask technology questions and receive definite and clear answers. One teacher said:

In the early stages of schooling, there's no great need for technology because children need to learn to be creative and free. Additionally, children need to know the basics of life, which technology can't teach as effectively as the teacher herself can directly. [P15, south region]

Overall, it has been suggested in the literature that technology can support children in terms of self-learning, such as by allowing them to learn the names of shapes and colours and by expanding their linguistic knowledge across different languages (Al-Rashed, 2002; Al-shaer, 2007). Furthermore, even when children are just playing on their devices, there is a chance that they are improving their knowledge of, and skill in, the use of the English language, as most games make use of English as a medium of communication (Al Mulhim, 2014). This

may be an important issue as it can have a significant impact on the Arabic educational programs implemented in school owing to the interference of the English language (Al Mulhim, 2014). According to some researchers, though, many teachers believe that technology is essential because it helps them plan their lessons in such a way that can engage their pupils and make the educational process easier and more enjoyable (Cox et al., 1999; Kara & Cagiltay, 2017). Therefore, as is evident in the existing literature, technology can support learning in a number of areas.

Sub-subtheme 3: Teacher support. Technology arguably provides teachers with the needed support for their lessons if they use it to their advantage. For instance, instead of planning worksheets and other activities, teachers can use the time to explain the lesson through interactive apps, games, and images, among other things. Correspondingly, it was argued by the overwhelming majority of the teachers in this study that children can benefit from technology, as suggested by the following teachers:

Children of such a young age are considered visual and practical learners as they are still highly creative, so if teachers spend more time looking for technological resources for children, find some and use them, children will be able to benefit a lot from such resources especially if they are relevant to the lesson and are colourful. [P8, west region]

If teachers combine practical learning in real life and visual learning through technology, I believe it will produce the best outcomes for children not only because it will expand their creativity but also because it is an efficient way for them to learn. This means that the use of technology in teaching will simplify young children's learning. [P6, west region]

Despite the increasing availability of technology (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010), several studies report the underuse of technology by schools at all levels (Alasimi, 2018). Along with institutional conditions faced by teachers, technical barriers can make it difficult to change and take a more active role in school-based technology use. These barriers include teaching philosophy, attitudes, beliefs towards the potential value of technology, comfort with technology, and a lack of personal use (Al-showaiby, 2010). Given that the majority of teachers in Saudi Arabia are educated in traditional learning-teaching models, it is critical to emphasise that the integration of rules, regulations, and standards that accompany such teaching strategies almost certainly has an effect on how they use technology (Elyas & Picard, 2010). Similarly, in this study, one teacher argued that:

From my point of view as a teacher, technology facilitates teaching in many ways, such as by allowing us as teachers to access the target students for the programs we will use as technology can offer us the information we need. The use of technology for teaching is also very helpful for the children as it will allow them to become more interested in the lesson, which will make it easier for them to learn. I strongly support the use of technology for teaching because it will facilitate our work as teachers and will provide us with the information we need. It will also allow children to easily get the information they need and will allow us as teachers to more effectively provide support to the children, which is what our job is really all about. [P14, south region]

It was also argued that the ideas of teachers are strongly related to technology in their classroom (Alasimi, 2018). In addition, early childhood teachers who have more favourable beliefs about the technological potential to support student learning have employed a variety

of technologies than their counterparts with more negative attitudes (Alasimi, 2018). As one teacher stated, through supporting children using technology, learning can become more interactive and more engaging, especially at a younger age:

Supporting the children has allowed me to set a positive example using technology. For instance, sometimes, when I show children a story in a book, and I don't see them interacting with me, I change the story, choosing a more interesting one, and I project it on the screen. This helps me explain things better and makes my job easier. [P15, south region]

Kindergarten teachers can use technology to support their pupils' learning in various ways, such as through the use of laptops, tablets, and video games. According to Al-Jadidi (2012), kindergarten teachers can use digital technology tools to facilitate learning. An example of a conceptual tool that can be used is project-based learning (PBL), a tool in which several programs are integrated to enable the students to learn by investigating a problem and finding a solution. Play-based learning is another tool that can help early childhood teachers, especially kindergarten teachers, to deliver content to children (Alasimi, 2018). These tools offer multiple learning actions that help kindergarten children design, produce, troubleshoot, maintain, select, build, and invent. Play-based learning can be the use of different games in the devices and different learning apps or websites such as *Preschool & kindergarten Games*, *ABCmouse.com*, *Preschool Math*, and *Homer Learn & Grow*. Such apps can be used to teach children through games; for example, an app may have a game requiring the player to find the correct letter for a word or to match the name of a shape with the correct picture and so forth.

Technology can support children's learning, especially when it is utilised to enable children to focus, and particularly to improve their skills (Lawrence & Aldossry, 2011). The main reason for this is that the use of technology for teaching young children will enable them to learn how to use technology themselves, which will give them better opportunities to learn as they advance to the higher levels of education (Al-showaiby, 2010). On the other hand, it can also be argued that even without the use of technology, support from teachers may allow young children to improve their skills overall. For instance, young children's listening and reading skills can be improved if they will listen to stories and learn to read them (Alfahad, 2012). Therefore, despite the effectiveness of technology use for teaching, it can be argued that help from teachers is also required (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010).

Subtheme 2: Technology is the future. This theme emerged as a major theme in the interviews in this study. The following sub-subthemes were gleaned from the data: jobs requiring technology, the evolution of technology, and technology as being important for the upcoming generation.

Sub-subtheme 1: Jobs requiring technology. It is vital for students to know how to utilise technology to their advantage and improvement. Furthermore, if technology use is learned at a younger age, the knowledge will likely be long-term and will likely support the learners later in life, specifically within one's future education and work (Lawrence & Aldossry, 2011; Alasimi, 2018). Additionally, many jobs in the future will involve technology to a large extent. As a result, it was argued by the majority of the teachers who were interviewed in this study that it is important for children's future success to learn how to use technology. These teachers said:

If children learn how to use technology now, they are likely to succeed later in life. Learning at a young age is like engraving knowledge on stone, and technology is becoming part of the day-to-day workplace. [P10, north region]

Learning refers to a person's active development of knowledge through the integration of new information and past experience (Aesaert et al., 2015; DuFour & Mattos, 2013; Ertmer et al., 2012). Researchers suggest that learners might take a variety of paths when they grow from beginner to expert levels of understanding, as they have varied personal and cultural experiences (Fullan, 2007; Parette et al., 2010). Therefore, even when given the same objectives, different school children learn in different ways in classroom environments, as they receive and grasp information and have to approach and understand topics in unique and personal ways (Cleveland & fisher, 2014; Bakkenes et al., 2010).

The jobs in the future are guaranteed to involve technology to a great extent, so learning technology now through one's studies, even in simple things like drawing on a tablet computer, will give the children a headstart. [P17, female, Middle region]

Technology makes teaching easy, and I can imagine that it makes the job of many other people easier. Also, without a doubt, the children I'm teaching will grow up with technology and will work with technology as it is the simpler and more efficient way to do practically everything. [P6, west region]

As previous discussions show, many of the teachers who were interviewed expressed their belief that learning to use technology at a young age will prepare children for the world as they will learn how to perceive those technologies are among many tools to support learning;

therefore, it is convincible that technologies, play, inquiry-based learning and teacher-led activities are important in ECE.

Sub-subtheme 2: Evolution of technology. There is little doubt that over the years, technology has progressed to the point that in many classrooms, projectors, computers, tablets, laptops, and more are present. The teachers' commented on a number of aspects of the evolution of technology, as follows:

Technology has improved to a great extent, and it's hard to ignore the fact that it's taking over the world. In my opinion, it should be embraced and expanded. For instance, I've seen spelling games for children, combining learning spelling with games — that is, combining something that children need to learn with something they like.
[P1, east region]

In my opinion, websites should be used in the classroom to let children have more freedom while learning. [P3, east region]

As established throughout this thesis, the use of technology in ECE can be a controversial topic. Although some may believe that young children need no technology, it can still play a helpful role in the learning and development of a child. Furthermore, learning how to use it is vital to today's way of life in our technological world. However, the usage of technology does not simply assist children. It also gives early childhood teachers limitless access to newer, more inventive instructional approaches to help young students learn in an active environment. As a result, it has been argued that:

I use a projector to show the children our activity for the session, such as matching a picture with a letter. Sometimes I scan a story from the book and show it to the children on the screen. The size of the screen makes it possible for all the children to see and focus on what's being projected on it. When I ask a question about the story, it's easy for the children to find the answer. This also saves my time and effort, so instead of showing the children a picture in a book, knowing that some of them won't be able to see the picture, I use a projector so all the children will see the picture. It's also a fast way to explain the lesson. [P19, central region]

In education, digital games can function as a training tool that can be used for all ages. Games can lead to a lifetime experience of problem-based learning that cannot be recreated in the classroom (Cleveland & fisher, 2014; Bakkenes et al., 2010). While the individual student invests time in a game, the learning process can happen unobserved. That is, children often do not know that they learn via built-in educational content (Crompton & Keane, 2012; Pynoo et al., 2013; Wood et al., 2013). Interactive learning environments can promote deep learning by integrating knowledge contents into a mediated technology environment (Wartella et al., 2013; Ertmer and Ottenbreit, 2013). The interest in this study is to explore the key aspects and development processes required in schools for school reform. One teacher takes a positive view of using technologies to support children's learning:

I believe that using technology in schools is a great idea because it simplifies my job and reduces the time and effort, I have to put into it. Before the dawn of instructional technology, teachers spent much time working on educational materials, which cost too much money, especially in kindergarten, where you need to use so many educational materials daily. With the help of technology, I do not need to spend much money and

time coming up with instructional materials that I can use only once and will thus just throw away at the end of the year. Above all, I am not sure that the instructional materials I come up with can really make the children learn what they need to. Now, I use programs to create videos that clearly explain to the children the concept I want them to learn. I also use pictures and merge them with a video, for example, to create a story. [P11, north region]

Teachers may have positive attitudes toward technology, but there is less evidence of uptake and implementation into their pedagogical approaches. Thus, the rapid development of instructional technology has had a great impact on the way children learn (Mumtaz, 2000; Almutairi, 2015; Alqurashi, Gokbel, and Carbonara, 2017). In addition, schools are able to save money when they use electronic devices for instruction as class materials can be stored digitally (Wohlwend, 2015; Alghamdi, 2016; Al-showaiiby, 2010). Therefore, not only will schools benefit from the use of instructional technology, but students will also benefit as they can learn more effectively (Al-shaer, 2007; Alshehri, 2014; Woo et al., 2016).

Sub-subtheme 3: Technology as being important for the upcoming generation. Due to the worldwide wave of technological integration, teachers often believe that technology will become an important part not just of how people learn in the future, but also of how life will be like in general for the next generation. In addition, teachers believe that learning with technology at a young age will aid innovation when one is older, as technology can be understood as a tool to create new ideas that are needed for development. For example, one interviewee stated:

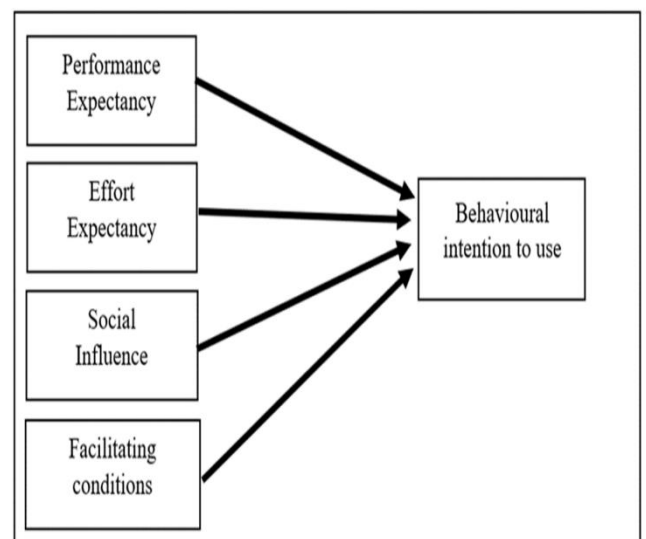
I would say that the goal of any teacher is to see her students succeed in life, so as a teacher, I agree that technology is needed in the classroom because it will allow the

children to become innovative and creative. I know many people will disagree, but I think the correct amount of exposure to technology can increase creativity to a large extent. [P6, west region]

With the increasing access to technology in schools, and the ongoing underuse of technology, some have noticed that personal obstacles can make a difference in how teachers adopt technology in their classrooms (Wohlwend, 2015; Alghamdi, 2016; Al-showaiby, 2010). A teacher may be knowledgeable about how to use technology that eliminates obstacles in the first place, but this does not always prompt the teacher to consider the worth of technology for teaching. Indeed, researchers have established that individual attitudes about technology, such as faith in technology or worry about its use, are associated with the actual use, or lack thereof, of technology (Al-Joudi, 2000; Al-Omar, 2013; Ajzen & Fishbein, 2005; Al Mulhim, 2014; Alasimi, 2018). In a similar vein, one participant argued that:

I cannot stress enough the importance of technology for the generation we are teaching, but I am not sure which is more beneficial at this age: technology or practical learning. As a teacher, I want my students to succeed in life, but it is hard to succeed without being adept at technology. Of course, technology can also pose challenges if it is not utilised correctly. [P14, south region]

Venkatesh et al. (2003) have presented the ‘unified theory of acceptance and use of technology’ (UTAUT) to describe what motivates workers to adopt and use technology. In this, the authors identified four primary factors influencing the adoption and usage of technology: performance expectations, which define how users feel technology will assist them in their job, the anticipated effort or perceived ease with which technology is used, societal impact upon technology, and the enabling circumstances of technology. In addition, the authors suggest that four elements influence the relationship between the four main structures and the real usage of the approach. These elements are age, gender, previous technology experience, and whether it is voluntary or not to utilise technology at work. Surprisingly, this theory aligns with the present study’s outcomes, as belief, resources, and the overall environment have been argued by interviewees to affect kindergarten teachers.



Technology facilities have become broad, especially in the field of education. For example, before the emergence of instructional technology, teachers would explain things, but they were not fully understood by the children because we couldn't apply them to reality. Thanks to technology, however, we can already show things to children while explaining them. Even we as teachers can learn using technology as we can search and find things very quickly through the internet. I use a computer connected to a projector to show my students some pictures or videos that would be impossible for me to show them in real life, such as how a volcano erupts. I just show it to them using

technological devices. Teaching thus becomes simple for us. Unlike in the past, it is now no longer necessary for kindergarten teachers to bring educational materials or pictures to class and to have an overstock of papers; I just show everything through the projector. Technology thus makes teaching easier for me. I think that learning will be so much easier in the future and that children will increasingly rely on technology. [P3, east region]

In the existing literature, it has been suggested that technology will play a significant role in the future of children. For example, future education and daily life will likely feature more automation and reliance on technological devices compared to the present (Abir, 2019). This is likely due to how useful technology has become and how effectively it can be utilised to simplify everyday tasks such as learning (Alfahad, 2012). On the other hand, technology may adversely affect children because if they utilise technological devices without parental control for a long time each day, they may begin to develop behavioural problems such as nervousness, anger, and fear, and these are likely to remain with them when they are already adults if technology is regularly used to teach them thanks to the rapid advances in technology as a field (Al-Rashed, 2002; Al-shaer, 2007; Al-Alwani, 2005).

Furthermore, it has been suggested that the world is changing rapidly, and even specific professions have become different due to technology (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010). For example, teachers have historically taught using handwritten lesson plans (Al-Joudi, 2000; Al-Omar, 2013). In addition, professions in general were limited compared to today, but when the students of this generation begin to work there will likely be further technology-based roles, such as those of computer scientists, web designers, and graphic designers (Abir, 2019; Abouelnaga et al., 2019; Al Mulhim, 2014). Many disciplines also depend on the use of technology, such as artificial intelligence. Therefore, it is important

to consider the future of children when contemplating whether to use instructional technology at present, as the decision may create struggles for children later in life. On the whole, many of the teachers who were interviewed expressed their belief that learning using technology at a young age will prepare children for the world as they will learn how to utilise the most effective tool for innovation.

Subtheme 3: Improving children's technological skills. Technology is embedded in children's education at all stages, and higher education increasingly requires the utilisation of technology. In addition, in the future students will be required to use technology for their learning, leisure and work, and as such, it is important to ensure that children become used to technology. Through the use of instructional technology today, children can improve not only their knowledge but also their ability to use technology. The following sub-subthemes of subtheme 3 will be presented and discussed here. They are, learning technology use early, and improved learning.

Sub-subtheme 1: Learning technology use early. Most of the study participants argued that if instructional technology will be utilised more in kindergarten, then children will become adept at using it. In other words, it was suggested by participants that technology would allow children to gain the required technical skills that would boost their learning. In addition, participants conveyed that early technological learning would put the pupils at an advantage later in life not only in terms of their education but also in their future workplace. For example, some interviewed teachers argued:

If we use technology in the classroom now, our students will know how to use it when they're older. Who knows? They may even become experts! They can also learn better because of the widely available technological resources. [P3, east region]

The use of technology in the classroom has few limitations, and technology is almost a perfect tool to use in lessons not only because it makes learning easy but also because it simplifies learning for the children even in the next stages. [P13, south region]

Teachers may include technology into their whole curriculum or use it to complement a specific lesson. Variations in technology usage suggest considerable differences in teacher opinions of the educational value of technology. Teachers can practise the integration of technology, which is closely connected with their own ideas. The mindset of the teachers as to how children learn influences these ideas. If the teacher sees the learning of students as contingent on teaching explicitly, then that belief may lead to the classic chalk and talk technique driving class activity. Less computer-based technology integration in classrooms is associated with more conventional education ideals (Bakkenes et al., 2010; Bebell & Kay, 2010; Bidwell, 2014). The use of technology is therefore likely to be confined to additional demonstrative activities in some educational units. Teachers must experience an evolution from the classroom of teacher-led instruction to the student-centred classroom in order to make efficient use of computers (Aesaert et al., 2015; DuFour & Mattos, 2013; Ertmer et al., 2012). One teacher commented:

I've observed that when some children hold pieces of paper, they directly move their fingers on the paper as they do on iPads. This will affect them adversely when they need to hold the pen to write. This will surely be the case because, without a doubt, technology is changing the world, and soon the education system will be fully incorporated with technology that can teach children. [P12, north region]

Early learning of how technology can be utilised is crucial as it simplifies utilising technology in learning (Al-showaiby, 2010). The main reason for learning technology at an early age is that children who understand how ICT can be utilised are more likely to develop their experience, which may benefit them in later education (Alotaibi & Almalki, 2016; Alqassem et al., 2016).

Sub-subtheme 2: Improved learning. According to most of the interviewees, technology can improve learning, especially for young children. This section holds of what some of the interviewees said about this matter.

When I was a student in school, we did not have all of these technological resources, and I know that if I only used technology at a younger age, I would have become more independent and knowledgeable. [P6, west region]

The need to enhance young children's digital usage faces several obstacles in incorporating instructional technology into schools, yet the benefits are substantial (Johnson et al., 2016). Miller (2018) discovered that incorporating interactive technology in the form of educational apps into children's play-based learning experiences improves their capacity to generate abstract ideas and strengthens their inquiry practises and language abilities. The use of technology in education continues to expand opportunities for children's cognitive growth and active participation in play and school activities, both of which are important for developing core talents in the twenty-first century (Hsin, Li, & Tsai, 2014; Miller, 2018; Yelland, 2011). While playtime and physical objects are critical for cognitive development in children, awareness of contemporary technology is often regarded as a critical element of digital skills today (Yelland, 2011). Young children are likely to be inquisitive about everything, and they are typically eager to learn how things work. In other words, young

children are growing up as learners by studying and learning how to tackle their challenges. In alignment with this, teachers argued that technology supports their teaching in ways that support children's learning:

Technology makes teaching easier. For instance, videos can help explain the meaning of a concept faster and simpler. Using the projector can help the children become more engaged in their learning. [P14, south region]

By using technology, teaching becomes easy because the information can be accessed from anywhere, so I can search and find any information I want in a moment. [P15, south region]

The use of ICT in early learning provides an opportunity for young children to develop metacognitive skills, and to improve children's learning and playing experience (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010). Furthermore, Berris and Miller (2011) suggest that the use of ICT helps to promote the aspects that include increased self-esteem and improved motor skills of children in an early childhood classroom. Studies also show that the use of digital tools in children's schools enhances students' professional education and development, as well as the links and collaborations among early childhood centres, parents, and crucial childcare stakeholders (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010). According to Gjelaj et al. (2020), the effective integration of digital technologies into early childhood schools may empower children by giving them a voice they have never had before. This implies that, via the use of ICT, alternative social connections and learning relationships between children and teachers may be established (Hsin, Li, & Tsai, 2014; Miller, 2018; Yelland, 2011). Positive impacts were noted by one participant:

The upside is that technology has developed me, and I get access to the world from my place. Using technology with the children has not only allowed me to understand how to use it but has also taught me a lot by allowing me to search using the internet. I noticed that technology affects the children positively, and their parents tell me that their children have made good progress even when they're learning at home. At school, we use technology to help the children learn. For instance, we usually let the children do an activity and write their answers in their digital diary. They also often come to me with questions and ask me to search online to help them. I've found that children are more interactive in class when technology is used. When I used technology, I noticed that the children were sharing more and were more attentive. They also showed great improvement in their reading and writing because of their searches for facts and for the correct spelling of words. [P6, west region]

However, some of the interviewees disagreed that technology use for teaching can improve learning, and for this argument cited various technological barriers and the fact that technology may pose distractions on the part of the children. Below are some of the insights that were shared on this matter. In addition to documenting the prevalence and nature of classroom technology and media use, the teacher, classroom, and programme variables that may relate to the use of technology should be examined. This information will be helpful to understand whether specialised programmes or teachers should be addressed by future interventions that will have an effect on the technology of the classroom and the use of media. Indeed, current data suggests that technology and the usage of media may differ according per teacher, classroom, and programme variable. The lower screen time in early childcare settings has been connected with higher education levels, while the more experienced teachers have the

more unfavourable they are towards technology usage (Blackwell et al., 2013; Anthony & Clark, 2010; Stanhope & Corn, 2014). It has also been stated that the scheduling of media (i.e., offering extra hours of viewing) were connected with the increased television viewing. Likewise, teachers teaching kindergarten pupils have been shown to have more positive views towards increasing levels of school technology (Penuel et al., 2012; Wachira & Keengwe, 2010). Data from this study's interviews supports this claim;

I believe that technology can improve learning to a great extent, but not everything that can be taught by a teacher can be taught by a computer. I believe that at this time, the available instructional technologies are not yet as good for young children as they need to be, although I can imagine that in the near future, the available resources will have increased and will have covered everything that young learners need. Also, I believe that using technology for teaching may have a disadvantage: the children may become off-task because the tasks offered by technology are not made for everyone's liking. In other words, I believe that in kindergarten, practical learning would be far better. [P11, north region]

The existing literature suggests that technology can make learning significantly easier (Abir, 2019; Abouelnaga et al., 2019; Al Mulhim, 2014). For example, it is suggested that there is a growing need for instructional technology as it speeds up the learning process. Therefore, it can be said that technology is required to improve the education of children (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010). In addition, technology helps improve children's literacy skills. Savage and Wood (2016) have explored whether children are able to acquire literacy or language skills from the utilisation of technology. Accordingly, the study has established that technology has a positive impact on literacy. Furthermore, in a study conducted

by Ihmeideh (2009), it was asserted that kindergarten teachers are able to express their beliefs based on technology as it is important in the aspect of teaching both reading and writing. Correspondingly, there are various suitable computer programmes that can be used by children and can be utilised to support children in improving their literacy skills in various situations. Marsh and Singleton (2009) have also suggested that software developers are able to create high-quality, effective programmes which can support improving children's literacy skills without much effort, particularly for children who suffer from learning disorders such as dyslexia. Additionally, it has been found that computers foster a stronger excitement for mathematical education. Two further studies demonstrate that mathematical apps on tablets increase children's maths performance (Berkowitz et al., 2015; Outhwaite et al., 2017).

As part of Saudi Arabian Vision 2030, Saudi Arabia aims to have developed education in the country in various ways (Abdullah, 2020). For kindergarten education, one of the ways that education support is to be provided is through the use of technology. Authors such as Lawrence (2016) have argued that technology fosters learning environments. He claims that some of the advantages of using instructional technology for both the teacher and the student are socioeconomic development, language development, cognitive development, and technological literacy development, which are important in Saudi Arabia and in the current world (Lawrence, 2016).

5.5 Control Beliefs

Control beliefs are associated with certain elements that may either assist or prevent the adoption of a given behaviour from occurring. The results of the interviews revealed kindergarten teachers' control beliefs about Technology are a barrier to teachers developing their pedagogical approaches and practices to integrate technologies (Q3).

5.5.1 Main theme 2: Technology is a barrier to education (Q3).

If students do not know how to use technology, it may become a barrier to their education as they do not acknowledge how tools and programmes can be used to benefit them. Therefore, this main theme has three subthemes: technology offers distractions, technology use is less efficient than traditional teaching in helping children learn, and teaching children in the traditional way ensures the most progress.

Subtheme 1: Technology offers distractions. This subtheme is further divided into two sub-subthemes: technology distracts children from learning, and technology distracts teachers from teaching.

Sub-subtheme 1: Technology distracts children from learning. Many of the participants in this study suggested that if technology is incorrectly used for teaching, it can serve as a barrier to learning as it can provide distractions to young learners and can prevent them from becoming fully immersed in the lesson due to technical difficulties or being used in an off-task manner. This may prevent children from completing their schoolwork and from receiving the full benefits of digital learning. One of the teacher interviewees shared the following views:

I think technology does not take into account the different levels of experience of young learners. If the children feel that the program is hard to use and understand, it may create problems for them because they may feel useless and incapable even if they actually just need extra support. [P12, north region]

It has also been suggested that children who are unsure of how to use the particular instructional technology used in class may encounter technical difficulties (Alshehri, 2014; Alshowaihy, 2010; Elyas & Picard, 2010). As such, even though learning with technology may

be an effective way of learning, the difficulties that the pupils may encounter at the start may cause time wasting and may prevent the students from benefiting immediately (Alfahad, 2012). The main reason for these difficulties is that technology is effective for learning and teaching only when implemented appropriately for the age range and the topic or subject. Therefore, it is recommended that the gradual implementation of technology will allow the children to get used to it and may prevent them from getting distracted from the learning process due to technical issues (Abir, 2019; Abouelnaga et al., 2019; Al Mulhim, 2014). In alignment with this, one teacher identified other problems affecting implementation:

What is most difficult is that sometimes there's no internet in the school. I thus have to connect the computer to my phone, so I can use my own internet. Sometimes I could not connect to my phone's internet either. Another challenge that I face when the school devices are not working is I always have to prepare an alternative copy of the material I'm going to use on my iPad, and I bring my laptop so I can use it in case the class computer will not work. [P10, north region]

However, it is suggested in the literature that pupil distractions can be lessened by blocking certain applications and websites on the pupil's devices (Alfahad, 2012). As the pupils' distractions will be lessened through this, they can work in a more focused way and can thus learn more (Abir, 2019; Abouelnaga et al., 2019; Al Mulhim, 2014). Although it may be difficult to block certain applications and websites on the pupil's devices, ICT management in schools can itself be an ethically and practically complex matter due to the potential vulnerability of pupils' sensitive information (Alshehri, 2014; Al-showaiby, 2010; Elyas & Picard, 2010), therefore, if ICT is employed correctly it is able to improve the learning process of pupils (Al-Joudi, 2000; Al-Omar, 2013).

Furthermore, in the literature, it has also been argued that despite the considerable references to its positive effects on education, not all teachers were impressed with instructional technology. The quality of individual programmes is critical, and teachers are worried about whether children truly learn from educational gameplay or just strive to win the game without paying attention to the purpose of learning (Chu, 2014; Toda et al., 2017; Zainuddin, Chu, Shujahat & Perera, 2020). The visual impacts of instructional software are regarded to draw attention to the actual material, however there are fears that the rapid progress of digital games may lead to a lack of will to read and write (Toda et al., 2017; Chu, 2014). In addition, some teachers believe that traditional and digital methods are more effective since traditional methods offer tactile sensations and enable students to be more active in their learning processes (Chu, 2014; Toda et al., 2017). Interestingly, open-ended education has sometimes been viewed as more restrictive than traditional approaches because, often, students were excluded from their tasks (Toda et al., 2017; Zainuddin et al., 2020).

Sub-subtheme 2: Technology distracts teachers from teaching. Most of the teachers in this study suggested that using instructional technology distracts teachers from teaching as, like the pupils, they also encounter many technical difficulties. They have also experienced various other factors that have caused them to become distracted from teaching, such as the use of technology not matching the level of intelligence of the child, and teachers not understanding the basics of computers. One of the teachers shared the following:

Observation is necessary as technology does not consider children's differences in terms of cognitive levels. I think if every child has his/her own device, the device can consider the child's cognitive level as applications observe usage patterns and adapt to the user. As a teacher, I know how to approach my students' learning differences because of my experiences and interactions with them. However, when I use technology,

the time I could have spent teaching the children the topic is spent just setting up each child's device and going around the room to make sure that each child is completing the tasks applicable to him or her. [P6, west region]

The research on teacher–technology barriers has focussed mostly on education in kindergarten and has typically generalised how primary or secondary barriers impact the incorporation of technology across the aspect of teaching on different levels. Although this study provides a framework that explores early childhood teachers, it must be noted that such teachers may not be originally trained as kindergarten teachers. First, in Saudi Arabia, childhood educators tend to be less educated than teachers at kindergarten. It has been claimed that only 58% of kindergarten teachers in Saudi Arabia have attained a certificate of Child Development Associate (CDA) for teachers, which requires a bachelor's degree, whereas this rate is only 29% for childhood educators (Al-shaer, 2007; Al-Alwani, 2005). This is likely due to the fact that 85% of pre-school teachers being funded by the state have specific ECE training (Rashed, 2002; Al-shaer, 2007; Al-Alwani, 2005). Second, the quality of early childhood programmes (Rashed, 2002) varies, and there is currently no universal quality measure for this level of education. Third, in ECE, teacher turnover in Saudi Arabia is estimated to be at 20–50% a year (Al-shaer, 2007; Al-Alwani, 2005). As a result, this likely explains the lack of technological knowledge some teachers have. Interviewees argued that:

Some teachers have not yet studied the basics of the computer and thus think that it's unimportant. They learned in the traditional way as there were no computers and other forms of technology yet at that time, so when they started teaching, they were forced to learn how to use instructional technology, and that was hard for them. There's a teacher in the school where I work who does not know anything about technology. This

means that when instructional technology becomes more important later, she will have to spend much time learning how to use it, which will be a source of distraction for her from lesson planning. [P14, south region]

The simple challenge I'm facing in my classroom is that sometimes the technological devices don't work. This means that I need to fix the devices first to be able to teach the lesson. In other words, I need to focus on something other than teaching. I would say this is the biggest distraction for me as a teacher, and it can be easily avoided if there's a technician who can address the technical issue while I'm improvising the digital lesson plan. [P8, west region]

Some educators' belief systems are probably formed by the historical argument that technology may be a negative aspect in childhood. Nevertheless, technology has been shown in many cases to promote learning, however others have demonstrated the possible negative influences (Rashed, 2002). In addition, several researchers advocated for no screen usage for children aged up to two, and for no more than two hours for older children each day (Al-shaer, 2007; Al-Alwani, 2005). But others think screen time has its advantages (Ajzen & Fishbein, 2005; Al Mulhim, 2014; Alasimi, 2018). This lack of scientific recommendations could lead to greater uncertainty about the use of technology with young children, which could subsequently affect how or whether teachers integrate technology into their practice. However, in this case, it was suggested that technology can provide a platform for teachers to engage with parents, but may not improve lesson quality:

Using technology to set up a meeting is probably the most effective way by which teachers can communicate with their students' parents. However, using technology is

typically less effective for instructing parents on how they can teach their children at home, as most parents learn how to teach their children when they're shown how to do this by a professional teacher. Moreover, even when we teachers have learned how to use technology in the classroom, we usually get distracted a lot as the children may not know how to use it, and the teacher needs to figure out the problems that arise in their use of the technology. [P17, central region]

The level of formal education of a teacher does not affect how he or she implements technology. I know some teachers who have the same education level as I do but who don't know how to use technological devices. I learned how to deal with technology by myself, but when I was just learning it, it distracted me from my teaching and prevented me from teaching effectively as I was investing so much time into learning and thus failed to come up with high-quality lessons. [P15, south region]

Studies have demonstrated that the use of technology for early childhood educators is significant for addressing first-order and second-order obstacles (Ajzen & Fishbein, 2005; Al Mulhim, 2014; Alasimi, 2018). It has also been stated that the attitudes of pre-school teachers affect the use of technology, and that teachers fall into two groups: technology-enhancing and technology-detracting. Technology may endanger teaching traditions and philosophies. Matching this trend, teachers have reported both favourable and negative views regarding the integration of computers in classrooms. The primary hurdles to integration have been previously identified as personal comfort, technology, material resources, financial resources, and established educational philosophy. Teachers are also concerned about children's access, experience, technical abilities, and parental support for technology integration. (Ajzen & Fishbein, 2005; Al Mulhim, 2014; Alasimi, 2018). However, few types of research have

addressed explicitly how barriers to the use of technology influence the early childhood educators' embrace and usage of technology. Matching this, a lot of advantages and disadvantages of technology were mentioned by interviewees, as technology in the classroom can be beneficial, however it can be distracting in cases that can affect learning:

The advantages and disadvantages of using technology with children depend on the teacher, whether she knows the right way of using technology or not. If teachers use technology in the right way, the students will obtain benefits from it, but if teachers do not use technology in the right way, it will have an effect on the children. As a teacher, I must be aware of the content of the video that I will show to the children, so I should watch the video before I show it to the children. However, the children sometimes get the video's content wrongly as opposed to when I explain it to them. Not only that, but as a teacher, I can sometimes be distracted by technology when I find something interesting and end up letting the children work too long on a task, or when I spend time trying to find a video and the children have nothing to do. [P4, east region]

It has been suggested that teachers should have various ways of dealing with the aforementioned issues (Al-Rashed, 2002; Al-shaer, 2007; Al-Alwani, 2005), particularly so that less time would be wasted. Furthermore, it has been suggested in the literature that schools should have an ICT department and should train teachers appropriately before implementing instructional technologies (Alfahad, 2012). Furthermore, there should be applicable programs for the suitable level of education (for instance, children learning apps would be suitable for younger age groups); for instance, efforts should be made to align teachers' skill levels with those of the children they are to teach (Ajzen & Fishbein, 2005; Al Mulhim, 2014; Alasimi,

2018). Therefore, on the whole, the various aforementioned issues regarding how technology distracts teachers from teaching can potentially be resolved in many ways.

Subtheme 2: Technology use is less effective than traditional teaching in making children learn. Technology has been argued to have less of an effect compared to traditional teaching as teachers may be unable to manage student progress as effectively. Therefore, this sub-theme has three sub-subthemes: teachers have more impact than technology, traditional teaching is the better way of making children learn, and technology has negative effects on children.

Sub-subtheme 1: Teachers have more impact than technology. It has been argued that technology does not always have as much impact on learning as teaching does. This is typically due to the fact that most of the technology programs used in classrooms are not adapted to suit individual children, whereas teaching can be adapted and is more interactive with the children as they are able to ask questions even when they do not understand.

The age of the teacher does not have an impact on her technology use because if she knows how to deal with technology, it will have a positive effect no matter what her age is, and vice versa. However, teachers were taught to teach without technology, meaning when we teach by ourselves alone, without technology, we make more of an impact.
[P4, east region]

Such issues were also debated and critiqued for young children's digital learning. Some researchers, such as Werner et al. (2016) and Nouwen and Zaman (2018), have pointed out that they are concerned with online hazards, video dependency, social isolation, and physical problems. Others have proposed that parents should play a mediatory role in preventing harm and regulating online activities for children, such as by developing guidelines for the use of

technologies and monitoring the usage of their children's digital media (Arnott & Yelland, 2020). However, in the last ten years, online learning cannot avoid all of these difficulties, and online learning is becoming increasingly prevalent and that increases its reach to young students at an unparalleled rate (Werner et al., 2016; Nouwen & Zaman, 2018). There have in recent years been growing and developing online programmes that serve children with impairments or children who in distant or impoverished environments in order to provide flexibility for learning (Werner et al., 2016; Nouwen & Zaman, 2018). In addition, Internet technologies have developed into the 'multimodal life' of contemporary children, and act now as social, cultural, and personal artefacts (Werner et al., 2016; Nouwen & Zaman, 2018). It should be encouraged, therefore, for children, parents, and teachers to establish a multimodal learning ecosystem.

Using technology for teaching young children has pros and cons. The pro is that it can improve children's searching skills. Many children have a very active imagination and thus ask a lot of questions, which can actually be answered if one knows how to search the internet using technical devices. The con is that when parents allow their children to use their devices all day long, it can cause a lot of problems. For instance, it can make it hard for the children to focus, and their muscles can be adversely affected due to lack of movement. Another advantage of using instructional technology is that teachers can use it to help their students, but that will also require manual teaching without technology. Thus, overall, I would say that technology has the same positive impact as teachers because all the content is being provided to the students and being explained to them effectively. [P11, north region]

However, it has been argued that teachers may have a greater influence than technology in certain situations:

I don't think technology can be helpful when you're training shy children to participate in the classroom. I have a very shy student in my class, and technology isn't helping improve her class participation. I guess the only way that her class participation can be improved is for me to help her as her teacher by asking her to contribute to the class discussion. This will help her to gradually overcome her shyness. This shows that teachers have a greater influence on their students than technology has. [P18, central region]

It has furthermore been suggested in the literature that the main disadvantage of technology is that it does not encourage teamwork among children (Aljabreen & Lash, 2016; Al-Jadidi, 2012). Additionally, its excessive use can cause further social issues for children (Alotaibi & Almalki, 2016; Alqassem et al., 2016). These social issues may cause further difficulties for the children in the future, as they may become incapable of communicating effectively. In contrast to this, it has been suggested by Sak et al. (2016) that early education teachers that have recently started teaching typically have positive beliefs about the utilisation of technology because they themselves have probably had to utilise it in their later education. As a result, such teachers can acknowledge the benefits of technology, such as the fact that it may allow shy pupils to increase their interaction with others and actually be able to engage more without having to do it in front of others; this may help solve a serious issue. Likewise, Khoo et al.'s (2015) study investigated how technologies (such as iPads) can be utilised for children's education through utilising applications that require students to sign in and complete tasks that have been set to meet their needs (Alfahad, 2012). Through this the researchers have

established that tablet computers are able to support children in overcoming their potential shyness and building up their self-confidence, as the technology allowed them to be able to share their interests and cooperate with their peers (Aljabreen & Lash, 2016; Al-Jadidi, 2012).

Children are drawn to the screen's glowing and moving aspects. They are interested in media in a variety of ways: they enjoy using them as much as watching others do so. Technology has then a 'magical' value of an object of high desire (Chaudron, et al., 2015). As such, because of children's attraction to technological devices, technology can be used for teaching—but there should be teacher intervention, as even though technology can provide support in teaching the conceptual content, it cannot teach individuals how to socialise with others and how to behave properly in different situations.

Sub-subtheme 2: Traditional teaching is more beneficial. Some teachers believe that teaching their pupils directly without using technology would be more effective for their pupils' learning, as, they argue, technology cannot teach children small details such as how to answer specific types of questions (Alfahad, 2012). In addition, technology cannot teach morals, and even if it can give children a wide array of knowledge it cannot enable the children to communicate as they should. Here are some of the interviewees' shared insights:

It depends on how the children use the technological device. If they overuse it, then it will affect their health adversely, particularly their eyes. It may also distract them, especially when they watch videos or games that contain fast-moving colours and images. That is why I see normal teaching as being better because children can engage, and it would not impact them adversely [P14, south region]

Given the rapid spread of technology in the classroom there are certain measures that educators and researchers alike can utilise to promote technology integration (Alotaibi &

Almalki, 2016; Hassell, 2016). Specific approaches to integrating technology and utilising it successfully have been suggested. Firstly, teachers need to be familiar with the technologies they utilise in their instructions. Teaching is a profoundly personal experience, and it can be stressful and disappointing to feel as if educators have lost their ability to teach in the best possible way. Every teacher will not have the best educational technology, and educators should be able to choose a technology with which they are most comfortable (Schacter & Jo, 2017; Mendham, 2014). They keep the crucial sense of class control by offering teachers more freedom of choice in their pedagogical strategies. While it is hard to overstate the importance of teacher autonomy in picking educational technology, it does provide a challenge in selecting from the vast array of accessible technologies (Schacter and Jo, 2017; Mendham, 2014). A second approach is a request for a better organisation of existing technologies to promote the acceptability of classroom technology (Schacter & Jo, 2017; Mendham, 2014). While a typical Internet search produces thousands of results for educational tools, there are very few locations where available technologies are efficiently organised and evaluated (Schacter & Jo, 2017; Mendham, 2014). Teachers should be able to identify tested technologies within a particular learning topic and access them conveniently. In this case, it has been argued that technology is important and teachers who do not utilise it typically believe that being taught the traditional way is more effective; this in and of itself may be based on literature which may not be accurate:

The level of a teacher's education may impact how she applies technology. Years ago, there were many teachers in this school who were against using instructional technology because when they were studying, they were taught in the traditional way, without the use of technology. They thus did not have any experience that showed them the importance of using instructional technology. To them, traditional teaching is better

than teaching using technology, as the former is more effective in making the students learn. [P2, east region]

Many academics have advised integrating technological capabilities in all teacher training programmes so as to give teachers of kindergarten the skills and experience needed for the use of technology in their specialised areas of content (Alotaibi & Almalki, 2016; Hassell, 2016). These programmes highlighted technological training in genuine teaching contexts. In this regard, teacher education programmes in the kindergarten provide a wide range of courses (Alotaibi & Almalki, 2016; Hassell, 2016). In the case of certain interviewees, even though the teacher may have been trained, they did not have the adequate equipment to use their skills:

All the teachers share only one computer. Sometimes you can't use the computer, or you can't use it for long as there are many other teachers who will use it. That's a big distraction for me and shows how unreliable technology is at this stage of its implementation in our school and country, unlike in other countries, where they even have IT [Information Technologies] technicians. So, for now, I try not to rely on technology too much because traditional teaching is the better way as it is more reliable. Occasionally, though, I use my phone or bring my laptop and connect it to the projector, or I borrow the school iPad, so we will have an interactive lesson, which is very effective. However, I usually use only the projector connected to my laptop and show the lessons that way. [P16, south region]

With the wealth of educational technologies available, it is important for teachers to feel confident and comfortable with their abilities to properly use them. Many current teachers grew up in an environment saturated with computer technology with access to technologies

like personal computers and the Internet. While teachers may believe they have no skills when utilising technology, they might also have less class control, less technology, and a lack of new options that use technology to build their lessons, which may make them reluctant to explore the positive effects of technology (Edwards et al., 2018; Manches & Plowman, 2017; McPake et al., 2013). With more conventional methods of instruction, teachers retain control of their classrooms and are not expected to equip themselves to deal with the challenges of educating digital natives in a digital world that may make them feel out of place. Wozney, Venkatesh, and Abrami (2006), in a survey of 764 teachers, found that class control and being able to monitor students' progress is one of the strongest predictors of the usage of technology by teachers. Teachers who believe that they lack training can either choose to use their existing experience with technology or postpone the use of technology until they have an adequate skill (Wozney et al., 2006). It is vital to increase confidence in the process to grant teachers the knowledge, training, and support they need to utilise technology to improve their lessons. Matching this, many of the interviewees argued that technology should not be used in the classroom as it makes the children less engaged and less focused on the teacher:

It will have a negative impact when the child plays with the device for hours without moving, eating or drinking, which will bring about many health problems. It will also affect the child's ability to move and will make him or her lazy. Therefore, if we decrease the technology exposure, children can wake up and engage in a much better way [P15, south region]

The problem with using technology is that children can sometimes use it without supervision, whereas when I teach them, I can walk around the classroom and see what

they are doing and ensure they are engaging by focusing on them and seeing if they can answer particular questions. [P5, west region]

It has been suggested within the literature that utilising technology has some side effects, especially when a child uses it over a prolonged period of time, as it may cause the child to have decreased focus and to become attached to the device (Alotaibi & Almalki, 2016; Hassell, 2016). Thus, if children are exposed to their devices for a prolonged time, teaching them in person at other times may become less effective, as they may be unable to focus (Alotaibi & Almalki, 2016; Hassell, 2016).

Sub-subtheme 3: Technology has negative effects on children and their learning. It was suggested by the majority of the teachers in this study that technology can have many negative effects on children. More specifically, it can cause children to have various kinds of learning difficulties. Prior research has discussed negative effects technology can have on children's capacity for teamwork (Alotaibi & Almalki, 2016; Hassell, 2016) by isolating children from one another because there is no need for them to communicate with others as their devices can give them the answers to their questions (Lawrence & Aldossry, 2011). Likewise, there is a link between parenting practices and their children's level of attachment to their technological devices, as children who do not receive enough attention from parents tend to be more attached to devices (Al-Joudi, 2000; Al-Omar, 2013). Technology can cause many other issues, such as hyperactivity, developmental issues, diabetes, obesity, and a lack of focus (Schacter & Jo, 2017; Mendham, 2014). It has thus been suggested that while technology is considered useful to a certain extent, if it begins to negatively affect the user then further restrictions are needed or its use must be cut off altogether. Below are some insights on this that were shared by a number of the teachers in this study.

Technology can affect us negatively if we use it in the wrong way. I will tell you a real story of a child in my class, a girl who has been using an iPad from when she was only eight months old to when she was already four years old. Now, she does not know the Arabic language even though she is a Saudi; instead, she learned the Japanese language, among other foreign languages. When I asked her mother why her daughter didn't know Arabic, she said that she had been working in a hospital from 7 a.m. to 5 p.m., so when her daughter was still very young, she stayed home with her grandmother and used to wake up and sleep with her iPad. She spent all her time watching one cartoon video to another on YouTube. When I asked her to show me how to write some Japanese characters, she was not able to, but she could speak the language. After one year in my class, she can now speak Arabic, but she pronounces the Arabic words in the wrong way. Her biggest problem is that she acquired a foreign language as her first language in her first four years, not her mother tongue. [P4, east region]

There are several reasons why ICT is not included in early childhood programmes. The cause often comes down to the lack of expertise of teachers on how to use technology with young children (Uerz et al., 2018). However, there is sometimes a disagreement about whether or not the use of technology in kindergarten is acceptable (Alotaibi & Almalki, 2016; Hassell, 2016). Therefore, it is necessary for teachers in kindergarten to know how to use technology to educate children to improve their development and progress (Al-Joudi, 2000; Al-Omar, 2013). While it is not enough to introduce ICT in education, kindergarten teachers need to be able and trained to integrate ICT properly into their educational practices (Alotaibi & Almalki, 2016; Hassell, 2016). However, in this study, teachers reported that the lack of integration is mainly due to teacher perceptions or the lack of availability of technology:

I think technology can have either a negative or a positive impact on children's health, depending on how they use the device. In terms of children's posture, for instance, maybe the child does not know how to sit properly when using technological devices, which can cause problems such as back and neck pain. If we apply awareness guidelines during technology use, technology will positively affect children's health. Therefore, if the child was never taught the basics of technology, it will be confusing for him or her to use. [P13, south region]

Many scholars have recently emphasised the necessity to match the education of nursery teachers with their pedagogic integration of technology (Alotaibi & Almalki, 2016; Hassell, 2016). In addition, a great deal of effort and money was invested in policies and programmes to enable teachers in nursery schools to effectively use technology. For example, the 'Teachers to Use Technology' initiative of the US Department of Education has made funding available in support of development in teaching technology (Bell, 2001). It seems that the development of technology use among kindergarten teachers is a complex process that involves teachers developing multiple competencies and pedagogical practices (Edwards et al., 2018; Manches & Plowman, 2017). In a review of the quantitative research conducted during the preceding training on teacher technology in children's nurseries, Kay (2006) found that it is still not obvious which techniques are efficient for teachers to use. In this study, teachers believe that their teaching may be more effective if sufficient devices are made available:

One of the barriers that I face when using technology is controlling children in the classroom because using technology is new for them. Also, they all want to take part in the activity at the same time, which is hard. So the school has to increase the number

of games and devices that the children can use so they would be enough for all the children. [P15, south region]

The growing popularity of education technology in schools also leads to more worry over the safe usage of technology by pupils (Alotaibi & Almalki, 2016; Hassell, 2016). Enhanced availability of the technology can expose children to graphics, predatory online materials, fraudsters and hackers, and cyberbullying, either purposefully or inadvertently. In this case, it was argued by one interviewee that technology has more of an effect on children's day to day life as it causes them to be, in a way isolated, from society:

I cannot tell [if technology has negative effects on children] because it depends on the child's experience and on how the child uses the technological device. When the devices are available for the children to use 24 hours a day without supervision, it will surely adversely affect their future. It will adversely affect their health and academic achievement. It may also cause other problems, such as disliking books and not wanting to study from them because they will prefer to tinker with their devices all day long. However, I believe that if we prevent children from using technology, it will also affect their future negatively because they will become isolated from the rest of the world. Forbidding them from using technology is a big mistake because it will limit their knowledge horizons. So, there must be a balance in the use of technology, not excessive and certainly not non-existent. [P14, south region]

Studies have shown that technology may have a harmful impact. Violent television and video games have particularly been linked to violent and anti-social behaviour, while heavy television use is linked to less time, reduced language and literacy, and later issues of attention

(Edwards et al., 2018; Manches & Plowman, 2017; McPake et al., 2013). These concerns probably impact early childhood education professionals' own attitudes about utilising technology to learn in different ways than teachers for older children, due to the opposing perspectives on the benefits and drawbacks of technology for young children. In this context, in caution of the issue of, for instance, smartphone addiction, it has been recommended that children under the age of two should not spend more than one hour per day using technology, while children beyond the age of five should spend up to only 1–2 hours per day on digital devices (Al-Omar, 2013; Mansour, 2009). Inversely, research findings show that children frequently violate the proposed screen-time limitations, and that not many adhere to the guidelines and tend to overuse devices at such a young age, causing early addiction (Al-Omar, 2013; Mansour, 2009). Educational professionals from several disciplines have in recent years developed and deployed computer games for training purposes. One problem for game-based learning, however, is the issue of incorporating intense learning in-game elements without violating or ruining games. Educational gaming can be less effective as a learning tool for a group of learners, who were not participants or who found it difficult to extract knowledge from the games (Hyun & Davis, 2005). Thus, the successful adoption and use of ICT in kindergartens should be guided by removing these negative sides of technology such as prolonged use:

It will affect one's health negatively if the use of technology is prolonged. It can cause vision, backbone and neck problems and can also affect the brain in the long term. Actually, if a child is not supervised, not given a goal to pursue, not put under control and not given time limits when using technology, there will be many negative side effects. One is the child can gain access to some bad websites. [P17, middle region]

According to several academics, ICT is vital in preschool education since it may aid in the development of both the student and the teacher. Others, however, have noted that technology may also introduce hazards and restrictions (McPake et al., 2013; Plowman et al., 2011). Despite the difficulties related to touchscreen technologies and Internet accessibility, the number of youngsters who use online tools is continuously expanding. ICT offers the possibility to produce creative and communication activities for youngsters in contemporary education. It is therefore vital to focus the attention of educators on how to provide secure and healthy online settings for children, enhance their critical thinking abilities, and enhance their grasp of technology education in the twenty-first century (Edwards et al., 2018; Manches & Plowman, 2017; McPake et al., 2013). One teacher suggested that:

Technology has become one of the necessities of life that cannot be dispensed with if a person uses it well to obtain good results. Conversely, if used negatively, it will be harmful. I've seen the results of technology misuse on children. For one, they cannot speak well as they have poor vocabulary compared to other children. Another effect of overusing technological devices is the increasing number of children with autism. It also causes excessive movement. In addition, many children are not subjected to online censorship at home, and there are many harmful websites. As such, educating parents about the negative effects of children's excessive use of technological devices may reduce the harm it may cause the children. This can be done through WhatsApp and by sending awareness videos to the parents. I also want to say that in the future, technology will control everything; you can see signs of that now through the existence of robots that can perform surgical operations, etc. I believe that all the jobs in the future will use technology, so if we do not allow the children to use it now, they will become

ignorant in the future, and this will affect their life because they will not be able to find a job. [P19, central region]

In the pre-school training phase, studies evaluated the impact of playing computer games on children's general understanding and determined that computer games are effective in introducing some math concepts and other complex aspects that individuals would find difficult to understand (American Academy of Pediatrics, 2013; Bell, 2010; Mertala, 2019). The introduction of time- and location-based ideas has also proven more helpful in computer-supported instruction. Moreover, aspects of kindergarten education, such as the use of cartoons, theatre, computer education CDs, and educational TV series for children 60 – 72 months of age, were found to have a positive effect on children, while Internet games (those that are non-educational) and television series (those that are not educational) were found to adversely affect them. In the introduction of technology in preschool children, studies have likewise contrasted computer-supported learning with the traditional method and found that computer-supported learning in children with opposite terms is more successful (Svensson, 2013; Lemke et al., 2009; Hernwall, 2016).

Although access to computers and mobile devices has grown, the actual use of teaching technologies is still infrequent (Svensson, 2013; Lemke et al., 2009; Hernwall, 2016), particularly in early childhood education (Fullan, 2007; Parette et al., 2010). Moreover, technology is often not employed in meaningful, student-centred ways in education, but is interwoven in traditional teaching approaches (Aesaert et al., 2015; DuFour & Mattos, 2013; Ertmer et al., 2012). This lack of and the ineffectiveness of technology is one potential reason for this, and these account for two types of technology integration hurdles. External barriers also impede the use of technology by teachers, as in the case of teachers lacking technological access and time to study and utilise technology, or lacking training and assistance and

professional development. On the other hand, secondary obstacles limit the use of technology by teachers because of their beliefs in teaching, confidence in using technology, and perceived technological values for learning by students. Others have corroborated this difference and demonstrated that teachers are both bound by their environment's structural aspects and their personal beliefs (Facer, 2012; Chetty et al., 2011; Donnelly et al., 2011).

If the children use technology all day long, it will affect them negatively, but if time restrictions on the use of technological devices are imposed on them, and if they are supervised as they use technological devices, it will affect them positively. If the children play on their devices for a long time, they will eat a lot of chocolate and drink too many sugary drinks, which will affect their health negatively and cause them to develop some diseases, such as diabetes and obesity. I think it will also kill their creativity when they just keep searching for any information without getting useful information. Technology will have positive effects when it's used within the legal framework and in a way that will make you learn. It can negatively affect your health if you use technological devices for a long time, such as causing vision problems. [P4, east region]

These constraints, which continue to limit technology's successful use in schools, can be overcome by opposition to the utilisation of specific technologies in the current education setting. Teachers must continue to be equipped with the tools and resources necessary to maximise the use of technology in classroom instruction. In the absence of aid from teaching personnel for integrated technology, constraints such as a lack of money and time for accessible research technologies remain (NAEYC, 2012). Moreover, despite the investment in the successful integration of technology in schools, prior attempts have indicated that efforts will

remain worthless if technology itself remains the focus, instead of paying attention to teachers and their needs to integrate technology properly. Furthermore, general technology has been claimed by scholars to be less useful than the availability of education technologies—meanwhile training for teachers continues to be limited, unreliable, and largely unavailable (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013). Opponents of technological integration in schools essentially call for the national priority of education reform projects to direct technology towards the development of pedagogy, while providing teachers with a wide selection of teaching and learning methodologies and tools (Vockley & Lang, 2011; Stephen et al., 2013). One teacher described her response to these challenges:

Technology may cause distraction or lack of focus, not to mention hyperactivity. I haven't seen a real case of a child becoming hyperactive because of excessive use of technological devices, but I've seen many videos about the excessive use of technological devices causing a lack of focus and attention. The child in one of the videos could not sit still on the carpet for half an hour during the circle teaching session because he was hyperactive. He started moving his hands on the ground and doing acrobatics after some moments. His mother was asked about his daily activities after school. She said that he comes home, takes a nap, takes his lunch, and then plays on his devices until dinner time. His mother said he's intelligent, but she cannot control him as he's a hyperactive child. This was what happened in the video I watched. There was a boy in my class, though, who showed signs of hyperactivity. I contacted his parents, and it turned out that he watched a lot of videos and movies at home for hours without stopping. So I sat down with the boy and talked with him, with his mother at his side. I struck a deal with him: if he watched for less time and did more of his homework,

he would be rewarded in school with something different every week. Surprisingly, it worked. Now, he's one of the high achievers in my class. [P9, north region]

Excessive use of technology has also been reported as a leading cause of social isolation. The child may end up not being inclined to join a group and may instead prefer to stay alone (Mansour, 2009; Jaradat, Jibreel, & Skaik, 2020). According to Kara and Cagiltay (2017), many teachers believe that technology is a barrier to socialising. In addition, it has been argued by Jaradat, et al. (2020) that technology is able to decrease the number of human interactions that individuals can experience, which includes critical components such as those that cause early development. Furthermore, children may also require the support of others, as technology is able to cause addiction leading to loneliness. As a result, it has been asserted by Qualter et al. (2010) that continual loneliness may cause psychological stress, which may cause depressive symptoms for children. Therefore, according to some studies, technology overuse causes many mental and physical problems.

Conversely, various studies have suggested that there are teachers who believe that technology is able to increase the interaction between children, as it can provide them with a place where they can discuss and find solutions to problems they may face in school. Chow (2015) has also suggested that teachers believe that through using technology in a classroom setting there would be more interaction between the teachers and students. Similarly, Clements and Sarama (2003) discovered in their study that some teachers believe that technology increases collaboration and enhances children's problem-solving abilities. When youngsters play in a group or as peers on a single device, they are encouraged to engage with one another. Additionally, a study team in the United States analysed talks between kindergarten students as they engaged in computer-based activities (Hyun & Davis, 2005). The mentioned writers verified that when technology is employed, the quantity of discourse, cooperation, and

deliberate and thoughtful talks among youngsters increases. Therefore, it can be argued that technology is able to support students and encourage them to cooperate and become more confident in the classroom (Wohlwend, 2015).

Subtheme 3: Teaching children in the traditional ensures engagement of children is higher. The Internet and its associated technologies have the potential to transform conventional school-based education and have in fact already started to do so (Seifert & Sutton, 2009). Traditional teaching has arguably started to become less effective, with blended or hybrid approaches being used in all phases of education. However, the participants in this study argued that the main advantage of using traditional teaching would mean that children are more engaged, and the class can be monitored more closely on a day to day basis. Accordingly, this subtheme has two sub-sub themes: technology cannot give direct answers, and technology is confusing to use.

Sub-subtheme 1: Technology cannot give direct answers. Despite the fact that there are indications that the use of technology in teaching may be effective in helping pupils learn, a teacher can explain the lesson in a way that is tailored to the individual pupils' needs. In addition, it has been suggested by many teachers that even if technology can make learning easier for children, it cannot provide them with the direct answers that they need (Mansour, 2009; Al-Omar, 2013). One teacher in this study described different pedagogical approaches:

Technology makes teaching easy because the teacher does not need to teach the children all the time but can use the smartboard to communicate or explain information to the students through experimentation. For example, the teacher can use the smart board by instructing the children to do joint activities that can make all of them interact with each other. This can facilitate the work of the teacher. However, teachers are

sometimes needed to answer some questions as a device may not know some details. In particular, there are some websites that give misleading or false information, which further complicates the learning process. [P11, north region]

It has been argued that the role of teaching is not just to introduce new technologies to the students, but also to develop and provide teaching suited to use them. Teachers remain the most important component in school to determine student outcomes and allow for improvement in the classroom with regards to technology (Donohue, 2003). But it is tough for teachers to undergo new instructional modifications, especially if state and local legislation changes. In addition, changes in the law, regulations, and practices of governments influence the implementation of technological advancements in the classroom (Al-shaer, 2007; Alshehri, 2014). For example, governments determine investment and education policy frameworks in most countries. So, managers in the ministry of education can be seen as influential actors in the subject of technological integration, alongside teachers and faculty members. In this case, it is clear that teachers do not yet have the needed facilities to provide children with the education they need:

I sometimes face some challenges, such as difficulty accessing the internet. Also, the device's battery should be fully charged because otherwise, the device may lag and stop working. The internet is a big barrier because the school does not manage it well, so most of the time, the teachers are the best source of information, particularly when we are studying a topic a teacher is an expert on because the teacher can give the children the answer they want and need rather than having to deal with large chunks of information that they do not need. [P14, south region]

The study reveals that early childhood teachers appreciate the use of technology in the instruction of young children. The lack of technical and pedagogical skills by certain teachers has been shown to be a major contributor to their attitudes towards technology use. Appropriate training programmes to improve the chance of effective integration of technology can thus be advised to be created and carried out (Mansour, 2009; Al-Omar, 2013). Training programmes should provide teachers with the information and expertise needed to identify specific approaches and procedures for specific learning purposes. Teachers should also be free to select the appropriate traditional materials or technological instruments in specific learning situations (Mansour, 2009; Al-Omar, 2013). In-depth and practical technical knowledge, continuous assistance, and access to the newest technology and interactive media are necessary for professional growth.

Sub-subtheme 2: Technology is confusing to use. Rapid advances in technology demand that teachers keep up to date with new affordances (Aljabreen & Lash, 2016; Al-Jadidi, 2012). As such, technology causes confusion among older users due to its complexity. However, despite its complexity, it is still an important tool to utilise in the classroom. The following insights on this matter were shared by some of the teachers in this study:

We can use technology to develop children's skills. For example, children can play a game depending on their interests and can play it without difficulty. However, some teachers and older users may find technology confusing because they do not really know how to use it. [P15, south region]

The present report shows that many teachers in kindergarten do not believe they have enough technical know-how to employ technology in education successfully. Given that integration in technology in ECE is a relatively recent notion in Saudi Arabia (Aljabreen &

Lash, 2016; Al-Jadidi, 2012), it is not unexpected that educators believe that their technical abilities might not be sufficient. Educational training must sufficiently focus on technological integration (Aljabreen & Lash, 2016; Al-Jadidi, 2012). As a consequence, teachers need to acquire the required knowledge and technical abilities to use technology to teach young children. Teachers can then feel more secure and may easily include adequate technology in the ECE environment (Aljabreen & Lash, 2016; Al-Jadidi, 2012). In this regard, the focus on technology integration should be enhanced through teacher education curricula and teacher training programmes in service. One interviewee argued that:

I need courses that will help me learn how to deal with some computer programs. Generally, I love to discover things by myself. I find online courses on the internet more interesting. When the teacher has knowledge and understanding of technological devices and technology in general, it will be easy for her to access information. However, teachers who do not know how to operate technological devices as they were brought up at a time when these technologies did not exist yet may get confused. [P14, south region]

It was also suggested that technology can have other problems that affect teachers:

Technology has many advantages. One is it helps expand children's horizons. It's an encyclopaedia that can help us find many things. However, there are also some disadvantages, such as that it may cause back problems due to wrong posture or prolonged sitting. In addition, the use of technological devices may cause electrical charges in the body due to the constant exposure to their low-level radiation. Also, technology may pose problems to children's language development if it's not used

correctly. Technological devices may also cause confusion in children as they may not know how to use them to begin with. [P3, east region]

The present study demonstrates that not only early childhood teachers are concerned with technical capabilities. Moreover, many did not know whether technology devices and programmes were or were appropriate for early childhood learning techniques. In fact, some research has suggested that teachers in early childhood often consider technology devices and programmes not suitable for young children (Almutairi, 2015; Pongsakdi, Kortelainen, & Veermans, 2021)

Recently, teachers have started to alter their teaching approaches to include technology in education as a new concept in early childhood classrooms. Technology should not be used to supplant present views of teaching criteria and related practises of developmental appropriateness (Alqurashi et al., 2017; Pongsakdi et al., 2021). Technological integration can enrich the existing traditions in ECE; however, it is also vital to allow teachers to comprehend how technology use may be matched with existing ways of learning. Similar to other studies, one interviewee raised:

Most government schools have older teachers who may not be studying at the university and who cannot deal with technology. My sister is above fifty, and she's a teacher at a governmental school. She can't deal with technology, even with the simple programs, although she graduated from the university. This is mainly because the education faculty at the universities to this day still do not fully use technology; they mainly rely on traditional teaching. Therefore, it is the new generations of teachers who are more likely to use technology in the classroom because they have been using technology since they were young, and they have some technology coursework at the university. The

older teachers did not use technology when they were still students at the university or when they were still children because the technology was non-existent at that time. This just shows how confusing it must be when technology is introduced to schools without any prior training for the elderly teachers. [P20, central region]

On the whole, despite the fact that technology has been observed to have many positive effects, it can be confusing to use for many individuals, especially children with learning difficulties and older teachers (Almutairi, 2015; Alqurashi et al.,2017; Pongsakdi et al.,2021). Therefore, it is crucial to ensure that students and teachers are taught how to use technology in the most effective way before the technology is used in the classroom.

5.6 Normative Beliefs

Normative beliefs are influenced by societal pressure to favour or disapprove of specific attitudes and behaviours (Underwood, 2012). According to the results of the interviews, administrators, parents, and students' expectations had the most influence on instructors' intent to include digital literacy in their lessons. The results of the interviews revealed that kindergarten teachers' Normative beliefs about technology are widely available (Q2).

5.6.1 Main theme 3: Technology is widely available (Q2)

The third theme is that technology is widely available, and children and parents can use it to their advantage in terms of learning. Furthermore, due to its wide availability, integrating technology into pedagogical approaches can allow for significant improvement in pupils' learning. Parents will also be able to support their children at home more effectively as well as retain contact with their child's teacher as they have access to technology at home. This main theme has one main subtheme: technology is accessible in most households (children have

experience in technology use, technology is useful, and parents can monitor their children's learning through their access to technology).

Subtheme 1: Technology is accessible in most households.

This subtheme has three sub-sub themes: children have experience in technology use, technology is useful, and parents can monitor their children's learning through their access to technology.

Sub-subtheme 1: Children have experience in technology use. The majority of teachers have suggested that children already have experience when it comes to technology, as they likely have devices such as tablets or computers at home. Furthermore, teachers have suggested that as children learn to use these devices over time, such devices can be used to teach the children and to ensure that they enjoy learning. Some teachers in this study shared the following views on this topic:

Many children have devices at home, which can be helpful for children to learn a lot. For instance, scientific programs about animals and where they live, what they eat, and all the information about them can be used to help to teach children science. Also, I can use the computer to show the children purposeful stories that can help them solve some problems or overcome some challenges that they may face as children. [P11, north region]

The increased usage of digital gadgets by young children means that the integration of technology in kindergarten must be carefully addressed, especially considering that tablets and touchscreens are becoming cheaper and more accessible over time (Al-shaer, 2007; Alshehri, 2014; Woo et al., 2016). In addition, the value of technology in young children's education seems to be recognised by most parents and educators. While teachers regard technology as an

unavoidable element of child development, many still objects to the use of technology in pre-schools since children want to play mainly outside (Al-shaer, 2007; Alshehri, 2014; Woo et al., 2016). However, the research underlines that it is increasingly important to introduce technology to children in ECE settings who have little or no access to technology at home (Roach, 2010; Whittingham, 2013). Therefore, teachers are the key reason for the success and failure to integrate technologies into the kindergarten setting. In particular, one interviewee argued that:

It is better if the teacher uses technology in teaching children because the teacher may have more experience in it as well as the children, and that can help the children to learn writing, reading and math effectively by using technology. [P17, central region]

The use of technology in early childhood environments should be instructional, exciting, and team-focused (Al-shaer, 2007; Alshehri, 2014; Woo et al., 2016). Technology use should facilitate inclusivity, promote play-based pedagogy, be simple and informative, avoid aggression or stereotyping, encourage parental engagement, raise knowledge of and worry about safety problems, and improve awareness of and concern about safety issues. For example, educators can make use of digital storytelling to create interactive lessons and improve motivation, commitment, attitudes, attention, and speech abilities for children during language classes. More specifically, interviewees argued that:

Children can enjoy learning when using devices. They can be attracted by characters, shapes and colours. So, teaching using instructional technology is different from the traditional way of learning, which depends on teaching using a board and pens. And of

course, the more experienced children are with technology, the more they use it and learn from it. [P10, north region]

I consider technology important, so I use it with the children I teach. In our school, we use technology to teach the children. It helps me a lot and allows the children to use their experience with technology at home to learn in school. [P7, west region]

Teachers' attitudes and views are essential to the use and effectiveness of technology in kindergarten. The way teachers use technology ultimately has an impact both on attitudes and on pedagogical and educational technology in general. The next sections examine these concerns and strategies to promote positive attitudes that can optimise the use of technology. As technology is increasingly used in schools, the major worry is perhaps the best implementation of technology rather than the use of technology (Kumpulainen & Sefton-Green, 2019; Project Tomorrow, 2011). As a result, if teacher's overall attitudes are positive technology can have a positive impact in the classroom:

I think shy children's experience with technology can help them participate in lessons more than they usually do. They can give their answer by tapping on a screen rather than speaking. This can make them more confident with the lessons, and it can show me if the child is on track. [P19, central region]

Teachers' beliefs have typically been classified into two categories in the area of education technology: teacher beliefs and student beliefs (Murphy & Headley, 2019; Ottenbreit-Leftwich et al., 2010). Teacher-centred attitudes usually relate to behaviouralism (see Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013), emphasising discipline,

thematic issues, and moral standards (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). The teacher oversees the learning process and is an expert in highly structured learning settings. Teachers with student-centred attitudes, on the other hand, prefer to focus on individual student needs and interests and usually employ constructivist or social constructivist approaches (Aesaert et al., 2015; DuFour & Mattos, 2013; Ertmer et al., 2012). For example, a student-centred approach to student participatory work in genuine discipline problems, utilising true tools in the discipline, tends to revolve around the active involvement of students according to constructivist theory (which is to say that knowledge emerges in the context in which it is relevant) (Karaca et al., 2013; Lindahl & Folkestone, 2012; Nathanson et al., 2013).

I show children some problems through a video, and then I give them a chance to discuss and compare the solutions. For example, I show the children pictures of past Saudi kings and their ancestors and then quiz them on who among these they can remember. This is easy for me to do as the children already have past experience with technology, and this allows me to use technology in many different ways that the children can understand and follow. [P5, west region]

It has been suggested that technology can help children self-learn, gain more experience on a practical subject, and better understand different aspects of life (Roach, 2010; Whittingham, 2013). It was also suggested that technology can enable children to overcome learning difficulties (Al-shaer, 2007; Alshehri, 2014; Woo et al., 2016). It is also believed that kindergarten children tend to adapt quickly to digital devices in school and at home when they already have some knowledge of them before reaching school age (Alharbi, 2018).

Prior studies on the use of ICT for educational processes have also shown several favourable consequences of the usage of ICT for pre-school children. For instance, the use of ICT in the

pre-school period can make learning meaningful and fun (Vockley & Lang, 2011; Stephen et al., 2013) and can inspire creativity (Ajayi, 2011; Harrison & McTavish, 2018). ICT also allows active learning to be individualised by teaching pre-schools (Svensson, 2013; Lemke et al., 2009; Hernwall, 2016). Preparation of children for primary education is one of the objectives of preschool education (Blackwell et al., 2013; Anthony & Clark, 2010; Stanhope & Corn, 2014). A study on the use of ICT in pre-school preparatory activities improved student motivation in the writing process (Cleveland & fisher, 2014; Bakkenes et al., 2010). Similar findings were achieved in previous studies, and young children were shown to receive increased motivation in informational activities (Wartella et al., 2013; Ertmer & Ottenbreit, 2013). Technology is seen as a significant means of developing children's social, cognitive, and linguistic skills at pre-school education (Aesaert et al., 2015; DuFour & Mattos, 2013; Ertmer et al., 2012).

Studies have also revealed that children who use ICT during this stage are better able than those who do not utilise it as it trains their information, problem-solving, and language abilities (Bakkenes et al., 2010; Bebell & Kay, 2010; Bidwell, 2014). The tasks of painting and drawing have an important role to play in pre-school education. On this note, some studies have demonstrated that youngsters employ the same procedures as if they used pencils or pastels in painting or drawing activities while using computers and tablets (Karaca et al., 2013; Lindahl & Folkestone, 2012; Nathanson et al., 2013), and that this increases their interest in painting and drawing (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). Studies have also examined the influence of educational technology on the learning and memorising of pre-school children in relation to foreign language instruction (Blackwell et al., 2013; Anthony & Clark, 2010; Stanhope & Corn, 2014). In this study, a favourable impact on the success of students was found in learning environments where learning technologies and material-supported instruction are employed. In addition, study research has also explored the impact of

the usage of a computer on pre-school children's social skills, showing fewer problem behaviours and improved social ability in children with higher computer usage (Ajayi, 2011; Harrison & McTavish, 2018). Studies also compared traditional versus computerised teaching methods in the period of pre-school chess and found that children who are taught computer-aided chess are more successful in the lesson and are more interested in it than children who are taught traditional chess and are taught through entertainment (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013).

Sub-subtheme 2: Technology is useful. In terms of use, it was suggested by many of the teachers in this study that technology can be used to allow optimal learning to occur in the classroom setting. Similarly, it was also suggested that technology is useful in many ways as it can allow children to visualise even remote things they are learning about from inside the classroom. Technology can also support learning as children are usually more engaged when they take responsibility. One of the teachers shared the following insight regarding this matter:

I use the educational technology books in the library corner. Using an electric pen, I point to a book, and then the story is read. The children can see the words and repeat them, which can help them learn how to read and also memorise the words. [P2, east region]

Technology is very useful in my lessons, particularly because I am a science and math teacher. After explaining the lesson, I can show the class a video related to the topic, and then I can quiz them later. This shows me how much they have learned the lesson and if I'm covering too much or too little during the lesson. [P15, south region]

I feel comfortable using technological devices while teaching because I don't need to have so many things in my hand and preparing for my lessons helps me not to forget anything that I want to say to the children, so it saves time. [P10, north region]

I feel comfortable when I use the projector because I know that children can receive and understand the information regarding the lesson and will be able to visualise it, making it both time-efficient and effective to use. [P3, east region]

Children between one and four years have been able to learn with innovative technology and haptic gadgets. Children use them for alphabet learning, language learning, playing, and drawing. The motion of the fingers involved in the use of these gadgets is connected with the way psychologists define reality by actions in the absence of their ability to utilise symbols and words (Ajayi, 2011; Harrison & McTavish, 2018). Working with the child is also an effective strategy for the parent to avoid using technology to keep the child peaceful or busy; cooperation allows teachers to protect the child and show an interest in what he or she does (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013).

I love technology. It helps the children learn because they already know how to use it. As a teacher, I use technology to show my students something that can help them learn and understand our lesson. I also hope that my use of technology will make the children more interested in our lessons. I think technology can be used in different ways, and the use of technological devices in the classroom can highly vary. [P6, west region]

Although a teacher agrees that technology has value, other variables affect the incorporation of technology (Karaca et al., 2013; Lindahl & Folkestone, 2012; Nathanson et

al., 2013). Ertmer et al. (2012) studied 12 teachers for their exceptional use of technology in their classrooms in order to better understand teacher beliefs while monitoring efficiency in the integration of technology. All of the study teachers showed belief in the importance of technology but also highlighted obstacles to meaningful technological integration, including a lack of resources, a lack of administrative support, technological problems, and a lack of testing. The importance of technology is therefore acknowledged by teachers (Crompton & Keane, 2012; Pynoo et al., 2013; Wood et al., 2013); however, due to circumstances of a lack of access to technology or a lack of adequate professional development, it cannot be implemented (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). The interviews of the present study, however, also revealed that some teachers changed their perspectives and developed positive attitudes toward technology overtime:

The ease of using technology in the classroom made me gain a positive attitude towards using technology with the children. At school, we have an educational projector, and there's a folder that contains books in the form of PDF files. In no time at all, I can open the activity and then start figuring it out with the children. Therefore, technology is very useful in my lessons. I also lend the books to the other teachers so they can use these in their classes. [P13, south region]

The school administration provided me with the tools that I would need to teach the children. These included a projector and internet connection, so through my mobile phone, I give my class a full presentation filled with all the information they need to know, and from there, they learn effectively. [P18, central region]

Digital technologies are a well-defined resource. They can develop creativity, manifest divergence and convergence of thought, and create executive understanding and originality (Bakkenes et al., 2010; Bebell & Kay, 2010; Bidwell, 2014). However, the resource loses its potency when ICT becomes a source of home entertainment or diversion and becomes a tool which allows teachers to ignore their children over the long term. Teachers often permit this when they think that the children have a suitable activity on devices. Children and adolescents utilise technology as an instrument for carrying out many duties during the day. If there is work that should be accomplished, users can search for solutions or instructions on the Internet and may create a unique form of personal interaction with the problem (Ajayi, 2011; Harrison & McTavish, 2018). Technology becomes vital in tasks for families with school-age children. In our daily tasks, technology and the Internet are essential and indispensable (Facer, 2012; Chetty et al., 2011; Donnelly et al., 2011). However, a negative aspect is that the use of technology gadgets by younger children is opposed by detractors, particularly when it comes to social networking. It can be perceived that several teachers may use technologies to support traditional pedagogical approaches (Murphy & Headley, 2019; Ottenbreit-Leftwich et al., 2010).

I had one course about technology when I was in the university, but the school offered us different workshops about technology, such as professional photography, which helped us learn how to take professional pictures of our students in the classroom and post these on our school website. I also took some online courses and workshops, which helped me in using Microsoft Windows. [P11, north region]

In my opinion, one computer per classroom is enough, especially in kindergarten, but it has to be connected to the internet. In kindergarten, I don't think it's important for

each child to have a computer; it's not necessary for each child. It's enough for the teacher to have a computer, which will allow her to show the children things related to the lesson on a screen. The teacher, therefore, needs a computer more than the students do. This will allow technology to be used in the most effective way as the children can learn the lesson better, particularly regarding simple tasks like learning to read and write. [P20, central region]

Similarly, it was also suggested that through past positive experiences teachers can also be encouraged to implement and improve their technological skills as it was argued that:

I think my technology skills improved while I was studying at the university. It increased my knowledge in many fields, such as religion and technology, as applied in my field of study. At the university, using technology is not optional but compulsory, so we had no choice but to use it. I now apply technology in my classroom because I've seen its positive results when I was still at the university and because it shows positive results with my students and is easy for me to use because I've had previous experience using it. This has allowed me to make the most use of technology, especially when I teach because it's the best way of presenting to the children what I'm teaching them and because it allows them to learn visually. [P3, east region]

Many studies on teacher barriers have been carried out in kindergarten learning contexts, but because of discussions on the importance of technology in young children's lives, the impact of personal attitudes on technology use may be even more significant for early childhood teachers. Research has demonstrated that great education media can improve the learning of young children (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009).

I believe that using technology can allow teachers to present more accurate information to their students and to do this in a more interactive and deeper way. I, therefore, think that technology is very easy and useful in teaching children. [P12, north region]

The upside of using technology with children is that it can make them feel excited and determined to learn, but it's not reasonable to use it all the time because it will affect their eyes adversely, which is the downside of using technology. However, technology use will be good when the information I'd like to present to the children is useful and will meet my target. Teachers should know when to use technology and not use it all the time because children may eventually feel bored when it's used too often, which will render instructional technology useless. Therefore, teachers should have the training and should be given the needed technological facilities to be able to teach children more effectively by making full use of technology. [P14, south region]

Teacher faith and integration barriers represent a wider range of work on technological integration; such studies explore the relationship between underlying teacher epistemology and beliefs towards technology and how they influence teacher practises (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013). Studies analyse the concept that teacher beliefs are key to a successful process of change (Cleveland & Fisher, 2014; Bakkenes et al., 2010). Teachers are often overlooked in educational discourse, and voices are suppressed (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013). If teachers' views are not included in school reform, then change often leads to a need for yet further reform to be sufficient for teachers and students (Karaca et al., 2013; Lindahl & Folkestone, 2012; Nathanson et al., 2013). My study shows that teachers' negative beliefs may create barriers or may facilitate the

effective integration of technologies. This also likely means that the removal of first-order technology integration hurdles will alone not boost the use of technology. Rather, information and abilities that can change beliefs are best capable of boosting teacher capacities (Blackwell et al., 2013; Anthony & Clark, 2010; Stanhope & Corn, 2014). Positive ideas alone do not, however, guarantee the efficient incorporation of technologies (American Academy of Pediatrics, 2013; Bell, 2010; Murtala, 2019).

When I was still in secondary school, instructional technology was virtually non-existent; our teachers depended on traditional teaching and just encouraged the students to participate in the class discussion. However, when I was already in the university, some technological devices had become available and were used in the classes, such as the smartboard. Frankly, with technology, education became easier to learn and enjoy. [P10, north region]

For many teachers, it is enough that they have the required expertise, trust, and faith to integrate technology meaningfully into the classrooms. However, the vast majority of teachers lack experience with regard to dealing with technology during teaching in the classroom (Nikolopoulou, 2021; Konca & Erden, 2021; Hatzigianni & Kalaitzidis, 2018). The culture to which most teachers have to conform has not adapted efficient teaching to include the notion of technology as a vital tool for student learning. It is crucial for people, in general to remain unified, and this can be even more important for teachers, particularly with strong school cultures in mind (Wartella et al., 2013; Ertmer & Ottenbreit, 2013). Conversely, views often change in light of cooperation and discussion, and cooperative teachers more readily think about computer use. Naturally, there might also be beneficial outcomes to the impact of culture or peers. For example, the recommendations of peers might provide the motivation for doing

things we might not otherwise do, especially if we can see good results as a result of our efforts (Vockley & Lang, 2011; Stephen et al., 2013). Innovation throughout schools generally occurs in situations where teachers offer collaboration and mutual support. Interviewees stated:

Technology helps me a lot. If I forget something about the lesson, it can remind me because I have a digital organiser, which helps me save a lot of time. [P12, north region]

The big challenge I'm facing is that I lack time at home to do the other things I need to do. As a kindergarten teacher and a mother, I'm busy, and I don't have time to design or plan the lesson incorporating instructional technology, but technology is actually useful for me because all I need to do is search the topic, find a presentation template, and edit it slightly. After that, I already have a lesson. [P19, central region]

Educational technology will likely play a more central role in this situation since technology allows students to participate actively in learning activities in which teachers facilitate the learning process. In constructionist learning environments, technological implementation from teachers was often constrained by challenges in fulfilling individual student needs, a need for teachers to balance numerous objectives, and a need to respond to external forces and expectations (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013). To intervene personally with his or her students, the teacher must be informed of the student's development.

I don't have any problem with using technology with the children, and the school provided us with devices such as a computer and a printer, which encourage us to use

technology with the children, but we don't have an internet connection, so I use my own cellular data. Technology is very useful for my lessons, but sometimes there are barriers to our use of it, which make using technology for our lessons increasingly difficult.
[P11, north region]

It has been suggested by the literature that technology has become one of the most useful tools in education (Donohue, 2003; Marsh, 2010). In addition, technology can enable visual and practical learning, which together make for more effective learning (Hyun & Davis, 2005). Likewise, it has been suggested that materials such as images, games, texts, and sounds can be used to make learning more interesting for children (Al-shaer, 2007; Alshehri, 2014; Woo et al., 2016). This is crucial because it allows children to get deeper insights into what they are learning rather than just using their imagination. Despite the simplicity of the technology, it can make a significant difference in children's learning when it is used to show children sensory and dynamic materials using a projector and a screen (Wohlwend, 2015; Alghamdi, 2016; Al-showaiby, 2010). Overall, technology can affect a child's future positively when it is used to provide children with materials that will allow them to obtain deeper knowledge, improve their skills, develop creativity, and gain a thirst for lifelong learning.

Sub-subtheme 3: Parents can monitor their children's learning through their access to technology. Most of the study participants suggested that parental involvement in the child's learning is crucial as it allows for supports children's learning and development (Alotaibi & Almalki, 2016; Hassell, 2016). This can further boost the child's progress and will at the same time familiarise him or her with the concept of online learning. Below is an important and related insight into effective integration of technology for communicating with parents and sharing learning across home and KG contexts shared by one interviewee.

Without technology, communication for me will be difficult. Even education will be hard because technology facilitates many of the teachers' tasks. For example, if I want to send the parents something, I won't need to send it manually; instead, I can send it via e-mail or WhatsApp. Also, if I want to tell the parents about something or show them a long clip, I don't need to write about it; I can just record it in an audio file and then send it, which will allow me to save a lot of time. If I want to show the children an experiment or a natural phenomenon, such as a volcanic eruption, I can send a short video of it to the parents, and they can show it to their children. [P10, north region]

It is vital that parents, teachers, and children communicate well. Technology allows educators to interact successfully with parents and to inform them of the progress of their children while also allowing them to play an important role in their child's development initiatives (Roach, 2010; Whittingham, 2013). Technology also enables educators to develop reliable ways of communicating and sharing more with students (Roach, 2010; Whittingham, 2013). In addition, guidelines for taking photographs and videos of children while they are participating in events and activities and for posting such photos on social media. In alignment with this, it was argued that:

I, the teacher, am the only one who uses the computer. I connect it to the projector so I can show my students things related to our lesson, but I also use it to contact the parents. I ask them to take photos of their children when they behave well at home and then send these to me. I then display the pictures in the classroom for all the children to see. This will encourage the children to behave well at home. Also, through my mobile phone and by using WhatsApp, I can contact the mothers, and they can discuss their children's needs with me. They can also access our website and see my plans and what

I have done in the daily timetable; this will show them that their child is learning much. In addition, I don't need to give a hard copy of the homework to the children because the parents can download it directly from the school website, let their children do it and then send the accomplished homework back to me. Technology, therefore, makes my job easier, especially in terms of communication with my parents. [P3, east region]

With regards to contacting parents, it was also argued that:

Contacting the parents became easy with technology. Parents can check their child's progress in class and book meetings. They can also receive digital letters from the school. The school also has a WhatsApp group for the parents, and I contact them through such a group, which simplifies the process as I no longer have to print letters and give them to the children to be given to their parents. [P19, central region]

In preschool environments, technology use is increasing every day to ensure that learners develop new skills and learn how to use devices efficiently. In the literature, it has been suggested that parents and educators can take advantage of educational apps with the many advantages of technology in ECE. For instance, these apps provide parents with a way to save time when they watch the development of their children (Alotaibi & Almalki, 2016; Callaghan & Reich, 2018; Aronin & Floyd, 2013). Teachers can also spend less time reporting on the progress and activities of learners. Adding to this, applications may boost the happiness of parents and educators who can witness first-hand the primary growth of a learner. Nonetheless, parents and teachers nonetheless should choose secure, unrestricted, and suitable educational software for efficient use with Android and iOS operating devices. In alignment with these study outcomes, it was argued by some teachers that apps are used by them and

parents to communicate effectively. For example, in reference to ClassDojo, an educational app, one teacher said:

Last year, we used an app called ClassDojo. It's like WhatsApp. It's been used in America and Europe. Each child had a character, and I uploaded many activities on the portal. The children could also upload their work there, and when they did, their parents could click the Like button. This encouraged the children to work on the activities. I also uploaded pictures and videos of the children's activities at the school, and I did that every day. I really loved it because it encouraged the children and parents to be active online, and that helped me communicate with them easily. But unfortunately, the school stopped using it, though and asked us to use the school website instead for that purpose. The website is so hard to use, however, because it takes a long time to upload the lessons, activities and pictures. ClassDojo is better, but we can no longer use it. [P1, east region]

Technology enhances my relationship with my parents because my communication with them became faster through WhatsApp. Before, we had to wait for the parents to come to the school for a meeting to discuss their concerns about their children. Now, communication has become easier and more flexible as I can communicate with the parents at any time and ask them about anything related to their child. [P11, north region]

Technology enhances my relationship with my parents, helping me establish a close relationship with them through our WhatsApp group. I can send everything I want to send to them through this app and group. For instance, I can inform a child's parents

that their child is absent, or I can notify them that their child has not completed his or her work or has missed submitting it altogether so that they can monitor their child's progress in school. Furthermore, technology enhances and improves my relationships with the children because it gives us an opportunity and ideas to discuss many things.
[P18, central region]

Similarly, it was also argued that communication with parents was also an important factor in ensuring that children are engaged in learning:

I communicate directly with the parents by using some apps, such as WhatsApp, through which I can send them pictures showing their children interacting with the other children in the classroom's study corners, playing and enjoying while watching a video. [P4, east region]

As part of a wider attempt to improve child performance and bridge the achievement gap between underprivileged children and their peers, legislators and practitioners have placed a premium on parental engagement with children's learning. Schools are also encouraged and are expected to provide children and their parents with information and access to learning tools available online (Sheffield, 2011; Gray et al., 2010). The provision of home computers and internet connectivity is considered sufficiently critical to understand that the Home Access programme in the UK has plans to encourage the acquisition of these technologies by low-income families (Reddick et al., 2020; Jewitt, 2011).

Technology improves my relationship with my parents. For instance, when one mother sent her daughter to our school, she was worried about her and kept asking about her,

so I started sharing videos with the mother of her child at work. Technology also helps mothers ask for help from the teacher to fix any bad habits their children may have, like nail-biting. [P5, west region]

Technology has improved my relationship with my parents. We communicate using the ClassDojo App, which makes communication more convenient than writing notes and asking the children to give these to their parents. In particular, I use the ClassDojo app to upload videos related to the lesson so that the children can review the lesson at home and do the homework and then send their accomplished work back to me. In addition, I use it to monitor the children's attendance and to inform parents of their children's absence. It's like a control program. Also, I use WhatsApp to communicate with mothers, such as if I want to relay any information to a mother related to her child, tell her about her child's achievements, or send her pictures of her child at work in school.

[P6, west region]

Technology can improve the relationship between teachers and parents because it makes communication between them easier. Through technology, I can remind the parents about the children's trips and parents' meetings, and they can ask me about their children's improvement. [P7, west region]

Life has changed. Thanks to technology, lessons are now very easy for me to plan, and children are learning a lot more than before. Also, there's more technology available, and schools are beginning to use technology more, which is actually very helpful because technology has evolved into a tool that can be used well in the classroom. [P17, central region]

Parental involvement in school activities, such as participation with school parent-teacher associations (PTAs) or voluntary work, is a distinct parental commitment to home-learning for children. It cannot be overstated, however, that involvement in school events may foster a dedication to learning and also serve as a vehicle for parents to communicate their educational beliefs and positive attitudes about their children's learning (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). The homework is the most self-evident occasion when parents participate in their child's education (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013). Parents usually do not participate in schoolwork as their children become older and tend only to participate if they sense a problem, but otherwise do not interfere with the job of the teacher (Bell, 2010; Mertala, 2019). There are several methods to interact with parents through technology, including email, text messaging, and classroom management software. On social media sites, parents and caregivers have access to information and guidance that they can use. Making parents feel important as they are doing something worthwhile is the foundation of excellent parent-teacher communication, particularly in primary schools and kindergarten.

Technology can enhance my relationship with my pupil's parents. I can contact them via my mobile phone and WhatsApp. Mothers can also send me pictures or videos of their children at home. We have a program that allows parents to express their feelings about their child's learning, which has allowed the flow of communication to be maintained. In addition, technology allows the parents and me to actively interact with each other as it allows me to send them e-mails about their child's progress and to assign homework for the children. [P12, north region]

Technology increases teachers' interaction with their students' parents. We can contact them through technology by using apps such as WhatsApp, which is better than sending them letters because sometimes, for some reason, the parents do not receive them. [P13, south region]

Interaction between family and school is critical to supporting learning and enabling a smooth transition from kindergarten to school (Facer, 2012; Chetty et al., 2011; Donnelly et al., 2011). Kindergarten schools are fundamentally different from elementary schools and have distinct requirements and barriers for fostering ties with home-schooling families. Schools can learn a great deal from each other's strategies, yet it is not easy to provide a single set of guidelines for kindergarten children due to the institutional systems, child, parent, and teacher requirements vary (Murphy & Headley, 2019; Ottenbreit-Leftwich et al., 2010). Home-school relationships have traditionally been more significant in elementary schools. Nevertheless, the teachers in this study reported how they respond to home-school relationships to support children's progress:

Technology improves my relationship with my parents as it's convenient and fast. I can contact them through WhatsApp to clarify things that need to be clarified about their children and to remind them about their children's homework or trips. Technology makes it easier for me to contact the parents. [P14, south region]

To contact my students' parents, I mainly use WhatsApp, e-mail and texting. I use these so that the parents and I can stay in touch with each other and can collaborate with each other to ensure that the child is learning well. I also use technology to send the parents pictures of their children doing the activities in class. When there are school

events, we send the parents pictures of their children via WhatsApp or e-mail, and we put them on the school's Snapchat account. Technology is therefore really very useful for contacting the parents. [P16, south region].

Teachers are seen as being responsible for having connections with the students' parents and connecting with the child (Ratcliff & Hunt, 2009). As a result, technology is able to be utilised in order to complete various tasks that can help the parents; for instance, sending e-mails to the parents to ensure that they acknowledge how their child has been active in the lesson. Additionally, through the utilisation of technology, teachers may also be able to inform parents of meetings they need to attend and can relay other important information concerning their children. This may establish improved connections between both the school and parents, allowing for the child's education to improve significantly (Donohue, 2003). As a consequence, according to research conducted by Clements and Sarama (2003), teachers and parents often claim that technology fosters positive connections by substantially encouraging sharing and communication. Henderson and Mapp's (2002) research have also suggested that the relationships that exist between teachers and parents are extremely important as they improve children's achievement. Following on from this, Palak and Walls (2009) have argued that some teachers believe technology is highly beneficial as a tool for communicating with their students' parents. Additionally, it is stated in the position statement of the NAEYC (2012) that 'technology tools can help educators make and strengthen home-school connections' (p. 7). Technology is thus important for teachers' communication with their students' parents and for the establishment of a close relationship between teachers and parents, which will improve the prospects for children's development. By reminding parents of meetings and by informing parents about their child's progress, school trips, etc., teachers can empower parents to improve their child's chances of succeeding in education.

5.7 Behavioural Beliefs

The findings revealed that the most often given responses were those regarding the kindergarten teachers' beliefs about Technology supports teachers (Q2+Q3).

5.7.1 Main theme 4: Technology supports teachers (Q2).

Technology can support teachers' efforts in educating their students in many different ways and can help them ensure that their students will benefit as much as they can from the use of technology in terms of their learning. For instance, technology can allow for many improvements in pedagogical practices. This main theme has the following subthemes: technology makes it easier for teachers to plan their lessons and the importance of further education for teachers.

Subtheme 1: Technology makes it easier for teachers to plan their lessons.

Technology can make it easy for teachers to plan their lessons, which will make lesson planning more time-efficient, as teachers can easily find the information they need for their lessons using the Internet. Furthermore, technology gives teachers access to their lessons at home, which allows them to plan their lessons in advance. This subtheme has the following sub-subthemes: technology makes it possible to plan lessons at home, and technology use for lesson planning is time efficient.

Sub-subtheme 1: Technology makes it possible for teachers to plan their lessons at home. Technology is highly accessible in the home environment. The prospects for access to the internet are positive, as indicated in the Saudi government's Vision 2030; the plan aims to cover 90% of houses with high-speed Internet by 2030 (Rizk, 2016).

Due to the accessibility of technology, many teachers use technology to plan their lessons in advance. One teacher stated:

Lesson planning is so much easier because of technology. I even enjoy using it. That's what I like about technology: it's accessible to anyone, anywhere. [P10, north region]

In schools, technology should be employed to enable teachers to develop their pedagogical approaches, and to address inclusive practices. Print products, for example, contain information for typical learners who use one a particular method of learning (visual learning, such as through images or text) whereas other children may learn best in other ways (e.g., by audio or video). Different types of learning assignments with varied degrees of difficulty and assistance are required to meet the abilities, interests, and requirements of individual students (for example, texts, images, video, animation, simulation, and audio) (NAEYC, 2012). Educators employ integrated technology in games to help students manage new information depending on their prior knowledge and experiences, their learning progress, learning styles, preferences, and learning requirements (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). According to research, game elements such as clear objectives, learner control, difficult tasks with feedback, and repetition help educators to create customised learning environments where students may take a more active role in their learning and achieve the desired goals (American Academy of Pediatrics, 2013; Bell, 2010; Mertala, 2019). Interviewees indicated how they use technologies to support learning:

We use technology to plan our daily lessons, not only our curriculum. The school administration is responsible for giving us the curriculum, but if they incorporate instructional technology in the curriculum, it will be more interesting for the children and for me. [P10, north region]

The provision of technology at home has helped me develop a positive attitude towards technology. For example, technology is the connector between the children and me, so if the children want to ask me anything about our lesson, when they are at home, or they need help, they can just contact me, and I could meet them virtually to talk about their lessons. [P9, north region]

Similar to the outcomes of this study, it has been suggested that technology can be used to improve curriculum planning similar activities (such as creating lessons and presenting them to the classroom, as technology circumvents the need for printing) (McKenzie et al., 2018; Marsh et al., 2017).

Sub-subtheme 2: Technology used for lesson planning is time-efficient. It was suggested by the majority of the teachers in this study that technology is time-efficient as it allows teachers to plan their lessons, and to spend the rest of their time completing other necessary tasks, such as focusing on students who need more help. The importance of using technology is that kindergarten lesson planning can be more enjoyable and productive; for instance, using PowerPoint to create lessons as slideshows can be helpful for visually engaging students. In addition, having pre-made lists of songs can be easier for quick tweaking during singing or music activities. Educational software programs and lesson plan templates can be used to not only to plan daily lessons, but also arrange teachers' ideas and aims that need to be achieved throughout the school year; technology can also assist teachers in organising assessments to track students' progress, which is a valuable way to save time (Popova, 2020). One teacher stated:

I used Microsoft PowerPoint to plan my lessons. So, when it comes to lesson planning, I just find a ready-made lesson, and I already have a complete lesson, and it just needs some changing to make another lesson. So yes, technology is efficient. [P6, west region]

Browsing online teacher forums shows that it can be challenging to adopt new technologies in lesson planning. This may be because many teachers are content with their present lesson plans. (Hassell, 2016; Mendham, 2014; Outhwaite et al., 2017). A general reluctance to change plans may come from, for instance, pre-set goals of teachers and current lesson plans to fulfil the demands of students or of the curriculum. Teachers spend hours preparing vital and fun-to-study lesson ideas. Checking the curricula means several hours of teacher work, which is troubling considering the tight schedule teachers often operate under (Hassell, 2016; Mendham, 2014; Outhwaite et al., 2017). Simply changing lesson plans may take a long time but modifying lesson plans to integrate technology is far more challenging. When new teaching tools are used, educators face the difficulty known online as the problem of double innovation; this adds a further level of innovation which teachers must deal with (Hassell, 2016; Mendham, 2014). Double innovation means that a teacher must first learn the technology adequately to use it in the class area before deciding how to integrate it with the aims and curriculum (Outhwaite et al., 2017). While education technology is getting easier to learn, the problem of double innovation still leads to additional time to prepare (Hassell, 2016). In this case, it was argued that technology is used to make lesson plans more efficient:

It's very important to have technology in the classroom because it facilitates many things. Today, my lesson is on the internet, which is better than using paper. If I need anything for my lesson, I can download it from the internet. In addition to that, we can quickly find the answer to any question on the internet, and there's much information

available that can help us. Personally, I'm satisfied with my use of technology because it saves me a lot of time and offers so many useful resources. [P9, north region]

In my opinion, technology makes teaching easier because it simplifies planning lessons and finds a great way to explain the topic to the children. Using a video can convey meaning quickly and shortly instead of spending a long-time creating means that help to explain the topic. Things like volcanoes cannot be explained verbally because children will not understand, but if internet sources like videos are used, the children will be able to understand more and may become more engaged in their learning. [P13, south region]

The time of a teacher is incredibly valuable, and so it is not difficult to mark time as a barrier to the integration of new technology. Teachers can be hesitant to incorporate new technology into the classroom for a variety of reasons. Once teachers decide to include technology more deeply into their lesson plans, they must pick which technologies to use. Choosing the most efficient online study programme, tutoring system, and even digital learning environment is a recurring and time-consuming task for teachers. Even while teachers find a technology or asset, it is not always apparent whether these will be helpful in practice. Many technologies promise to boost children's academic and cognitive skills; however, claims might be incorrect, and typically are made just as a form of advertising. It is an additional duty of the teacher to check the authenticity of these statements. As a consequence, technology decisions typically arise without the input of teachers from school or district administration. This can be helpful in some ways, saving teachers time and effort for technology evaluation, but a lack of options can also have a negative impact on a teacher's view of technology. Teachers can

consider the new technology as a burden when technology can facilitate and make their learning experience more joyful in reality.

When I use a technological device, I feel that it's letting me save time when I plan lessons. I also feel the need to utilise it as much as I can because it helps me a lot with my job as a teacher. I think that in the future, technology may take over the whole education system. [P5, west region]

Technology makes me comfortable in the classroom environment because when the child asks me about something, the answer is very easy to find on the internet; it is easier to make some changes to my lesson plan, which helps to clarify the meaning to the children. So, I do think that technology is a useful tool that saves much time. [P8, west region]

Children generally do not know what the Internet itself signifies, implies, or means. Children are unaware of the risks or benefits that may emerge from Internet usage. Oftentimes, children rather conceive technology as their preferred entertainment, for playing and viewing videos on a range of devices. When requested, youngsters were not able to reply to the questions of what the Internet is and what online means: the concepts are too abstract. (McManis et al., 2012). Young children do not know little to nothing about online threats, even though some websites have risks such as unsuitable content or pop-ups with integrated payment transactions (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009).

I like using technology because it makes the work of a teacher easier and promotes quality teaching. I used to prepare picture stories, which needed cutting lots of pictures

and sticking them together, but now all that is digitalised, and I can just play a clip with a story for the children to watch. [P16, south region]

When I organise an educational program for children, I begin with the easy level, then I observe the children, and if I see that they've tackled that easy level well, we move to the next levels. This has allowed me to manage the children's learning more effectively than before because I can see their screens through my computer, and I can see how well they're doing. [P20, central region]

I can devise some activities that can measure the children's abilities. From this, I can plan and choose suitable games for my lesson to be suitable for each child, which can help the children improve based on their capabilities. This enables me to ensure that everyone is moving at a suitable pace in terms of his or her learning. [P18, central region]

The roots of and manner in which teachers think of digital technology can be transformed in the early school years (kindergarten) to show that technology is important for development and exploration (Cleveland & fisher, 2014; Bakkenes et al., 2010). Indeed, teachers found it difficult to position themselves clearly without depending on the prevailing children's discourses (Kumpulainen & Sefton-Green, 2019; Project Tomorrow, 2011). This introduced another element of complication when it comes to early literacy techniques. New approaches to comprehending the possibilities of children's participation in digital literacy are thus apparently necessary, which and not just the open and explanatory examination of the digitally mediated activities of young children but also the tackling of difficult concepts for literature.

For me, the efficiency of technology depends on the program, as some programs are age-specific and have easy-to-advance levels, which address the differences among children. In the traditional style of teaching, with 25 children in the classroom, the teacher cannot address the students' differences. With technology, children's progress from one level to the next higher level can be automated. The children are tested at the start and can then gradually improve. [P19, female, middle region]

Using technology to improve the curriculum subjects is great by using it to plan and organise lessons and even make them available for the children to access at home. [P19, central region]

Technology has changed lives for the better and has simplified everything, especially in teaching (Plowman & McPake, 2013). For example, it has allowed teachers and students to access the information they need from one search engine (Gallagher, 2016; Domingo & Garganté, 2016). It has also allowed for many gaps in teaching to be filled. Therefore, the use of technology can ensure time efficiency to a significant extent, as finding information and making lesson plans have been made easier (Hassell, 2016; Mendham, 2014; Outhwaite et al., 2017).

Subtheme 2: Importance of further education for teachers. Due to the significance of technology for education, most inexperienced and experienced teachers would require further education to ensure that they can utilise technology effectively, particularly within the classroom setting. This subtheme has the following sub-subthemes: teachers must be further trained in using technology for teaching and learning, and teachers being more comfortable with technology.

Sub-subtheme 1: Teachers must be further trained in using technology for teaching and learning. Most teachers already have the skills required for teaching, but some teachers seek to acquire more technical skills that will enable them to teach more effectively, particularly in terms of planning lessons effectively to ensure that their students learn. Likewise, if teachers will be trained more intensively and comprehensively in the use of technology for evaluating pupil learning, they will also be able to better evaluate their pupils' progress, which will increase the chances that their pupils will learn curriculum content as well as wider life skills. The following insights were shared by some of the study participants:

I trained myself online, but I also joined a centre that teaches using a computer. I still want to take a computer course that will help me integrate technology into education because, as a teacher, I know it's important to be as efficient as I can, and I know that technology can help me with that. [P4, east region].

I have a computer diploma from Imam University. I also took other computer courses outside school. My experience in these courses tells me that teachers need computer workshops to help them not only in their school-related tasks but also in their day-to-day life. [P16, south region]

There is growing evidence that ICTs may be used effectively to support children's development and early learning (Wartella et al., 2013; Ertmer & Ottenbreit, 2013). Prior studies have been conducted to determine the influence of ICT training programmes on teacher perspectives and practises with regards to the integration of ICT into early learning settings, and into the kinds of ICT practises employed by teachers. Accordingly, these studies have found that there are barriers to the integration of ICT into their teaching practices (Gray et al.,

2010; Mertala, 2019). It has thus been recommended that teachers' practises should be changed due to the usage by ICTs, and that teachers may improve the quality of their ICT practices through training programmes (American Academy of Pediatrics, 2013; Bell, 2010; Mertala, 2019). Lastly, training would also be helpful to reduce the barriers that hinder ICT incorporation into the practice of teaching (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013).

I studied IT fundamentals. Also, I have an IT certificate from Cambridge. So, with that, I know the fundamentals of using a computer and the basic tools it offers. However, the school should still provide us with courses in computing and the English language as most teachers cannot utilise good computer programs because these use the English language as many teachers cannot understand English very well. Also, most teachers, including myself, don't know how to integrate their computing knowledge within their teaching. [P18, central region]

At the university, I took two courses: computing and using technology in education. So unlike other teachers, I'm partly experienced in using technological devices. [P3, east region]

Many educational systems are focused on developing ICT integration policies in curricula and in teaching practices as a whole (Facer, 2012; Chetty et al., 2011; Donnelly et al., 2011). These regulations necessitate an integrated framework that prepares teachers to integrate ICT into their teaching practices. From this perspective, training is vital for teachers to learn how to use ICT effectively, appropriately, and intentionally (Purcell et al., 2013; Storz & Hoofman, 2013; Inan & Lowther, 2010).

Teachers, especially kindergarten teachers like myself, need intensive training courses and workshops on the types of computer programs and apps that can be used to develop children's skills because, at the moment, not everyone has a working knowledge about these things. [P19, central region]

Teachers with bachelor's degrees generally have more experience in using technological devices such as Microsoft Office, but we still need courses in using technology in education. [P10, north region]

In any classroom, the teacher is responsible for the effectiveness of ICT implementation. As new technology tools are present, teachers must adapt how they use the materials in the classroom with young children (Purcell et al., 2013; Storz & Hoofman, 2013; Inan & Lowther, 2010). However, in any educational system, the main priority is to build training programmes to integrate ICTs into education and teaching. ICT integration training is critical since it has an effect on teachers' effectiveness in educational settings (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). Continuous professional development activities should also provide educators with sufficient resources and Internet connectivity, as well as access to videos and a professional network in order to exhibit, exchange, and debate real instances and uses of digital technologies (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). According to AlAmri and Saleh (2019), teachers should make use of effective, appropriate, and deliberate ICTs and provide opportunities for children to get more accustomed to ICTs in the learning environment. Additionally, these teachers must build up the technical abilities and motivation required for ICT usage with young children.

When I was a student at the university, I took a course that needed computing, but it is of no help to me now because when I was in the university, the computers were nowhere near as advanced as the ones today. So I had to take a training course in Microsoft Word outside the school. Some of my colleagues, though, have no clue about what they're doing when it comes to technology. [P9, north region]

I took one computer course while I was still studying at the university, so I have a computing certificate. But so far in my whole teaching career, the school has organised only one technology-related course: to show us how to design computer programs on smart devices and how to show these on a screen using a projector. [P13, south region]

According to a Swedish study on how digital tablets are utilised in pre-school education, 'there is a need to improve both staff's ICT competency as well as to raise children's own perspectives on tablet use' (Otterborn et al., 2019, p. 734). Some teachers may not have had much experience with meaningful use of technology in their own education, which may have influenced their beliefs and attitudes. As a result, teachers must be knowledgeable about digital media cultures that are crucial for children (Edwards, 2013, Mertala, 2016). The lack of information and awareness about how to utilise technology, or the uneasiness with technology are typical challenges for teachers wanting to integrate technology into their classrooms. Teachers who have these issues also struggle to get professional development tools that assist them in acquiring knowledge of and familiarity with technology. As a result, programs have been used, for example 'GoGuardian', which provide extensive training on how teachers can use the programme in their classroom to boost digital learning (Kumar et al., 2019). Teachers can connect to the GoGuardian team for continuous support and assistance and are given access to a wide range of teacher resources accompanied with suggestions on how to integrate

technology into the classroom. However, despite tools like this being available, some teachers still struggle with finding suitable training courses, and they are thus left lacking essential technological abilities:

I wish the school offered training courses about using devices and technology in general because that would help many of the teachers a lot as it would allow them to have the skills that they need to effectively manage a classroom through using technology without any issues. [P13, south region]

I took some courses about technology, such as a six-month course on Microsoft Office management training, particularly the Word and Excel programs. But in school, we need more courses for teachers. [P6, west region]

The deployment of technology is influenced by teachers' belief systems that determine failure or success. Research has been conducted on whether the beliefs and attitudes of teachers are important predictors of the usage of technology. Some empirical data supports the predictive ability of beliefs (Karaca et al., 2013; Lindahl & Folkestone, 2012; Nathanson et al., 2013), while other factors have found that the beliefs of teachers and actual practices are often inconsistent and that behavioural patterns are generated by external limitations (Penuel et al., 2012; Wachira & Keengwe, 2010). While teachers' qualifications have influenced their technological practices, teachers have also often felt constrained by international concerns (Cleveland & fisher, 2014). In two studies, attitudes toward technology were observed among teachers who make use of tablet devices; performance expectations and extrinsic factors were observed to affect their actual usage of the device (Cleveland & fisher, 2014; Bakkenes et al., 2010). In addition, while personal effectiveness and beliefs about the benefits of technology

have influenced actual use of technology, extrinsic factors like support for schooling and the development of professional development have contributed to shaping the readiness of teachers and attitudes towards technology.

I hope the education ministry, or the school will offer different technology-related workshops for us kindergarten teachers because it will help us know more about technology and apply it effectively in the classroom. [P3, female, East region]

I appealed to the Minister of Education to provide courses and workshops on technology for teachers and to select suitable teachers to take such courses. I also requested that every single teacher be provided with a technological device for her lessons, which is beginning to happen. [P4, east region]

Similarly, the importance of further education was also shown through already having experience in using ICT when the teachers themselves were in education:

I got certificates in Microsoft and Photoshop because my teacher encouraged me to learn these programs while I was in high school, and these have helped me a lot during my studies at the university as well as in my work, but I feel that I need to learn more about technology, and I wish the school would offer the teachers technology-related workshops and training because technology is important for teaching. [P5, west region]

Teachers who feel less confident in using ICT are anxious to use them in front of a student class that may know more than they do. Teachers who have experienced such anxiety

are generally less motivated or capable to employ technology in their teaching (Facer, 2012; Chetty et al., 2011; Donnelly et al., 2011). If teachers are uncertain about the use of ICT in school, then ICT integration will be less likely to be successful. The preparation of teachers with appropriate ICT expertise is therefore important in the successful integration of ICT into training (Murphy & Headley, 2019; Ottenbreit-Leftwich et al., 2010).

At the university, I got a computer diploma, but I've never attended any computer training sessions ever since I became a teacher. As a teacher, I need to attend workshops and take courses about technology. I hope the school will offer these because they will improve my knowledge of technology. Technology develops very fast, and with proper training, I know I will be able to follow its development. [P8, west region]

I had trained here at school in Microsoft Word, but I haven't taken any technology-related online courses because the courses are in the English language. That's an obstacle for me. There are varied technology-related courses in English, but the ones in Arabic are limited, if any. I wish I knew English so it could help me improve my technological skills. [P9, north region]

There is less research about teachers' ideas and attitudes about the use of ICT in teaching. Students have also been argued to have a better chance of succeeding in education through the use of technology as it provides a platform which caters to particular student needs (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013). In another study, which featured longitudinal monitoring of student education with and about ICT, students claimed that while growing their ICT abilities, they intentionally utilised their repertoire of learning methods

(NAEYC, 2012). Accordingly, the study saw many elements, including previous experience, and matching learning opportunities and programme attributes, as affecting their success.

Relatedly, one interviewee stated:

I don't need technology workshops because I love technology in general, and I learn many things about it by myself, so I believe it is a self-learned skill. [P7, west region]

It is a critical issue that teachers receive educational training rather than solely training in the use of ICT tools (Purcell et al., 2013; Storz & Hoofman, 2013; Inan & Lowther, 2010). In addition, teachers should be convinced of the benefits of ICT use in their teaching and should have their training focused on pedagogical approaches, curriculum planning and assessment methods. As noted in particular studies, after teachers had taken ICT development courses, some still did not know how to apply ICT in their classrooms; instead, they just knew how to use a computer and create printouts (Svensson, 2013; Lemke et al., 2009; Hernwall, 2016). Research also has shown that inadequate teacher training in their classrooms does not assist teachers in the use of ICT and teacher preparation (Penuel et al., 2012; Wachira & Keengwe, 2010). Scholars claim that this is because training programmes are not focused on the pedagogical practices of teachers in relation ICT, but rather on the development of ICT capabilities. In principle, teacher training is crucial for integrating ICT into teaching when new tools and techniques are presented (American Academy of Pediatrics, 2013; Bell, 2010; Mertala, 2019). Interviewees stated:

I took a computer course at the university. Frankly, I can't remember the name of the course, but it was related to the computer. I think it was about how to use technology

in education, but there's not much use now for what I learned from that course. [P10, north region]

When I was in school myself, I studied the basic things about computers. At the university, I studied computer principles, and we used computers to do our assignments. [P12, north region]

The beliefs of teachers are influenced by their personal experiences (Chow, 2015; Mansour, 2009). The more experienced teachers are with technology, the more likely they are to utilise it in their teaching (Schacter & Jo, 2017; White, 2015). As a result, teachers with little expertise may be unaware of the potential advantages of incorporating technology into their practice. Thus, the primary impediment to using technology in the classroom may be teachers' and students' lack of familiarity with information and communication technology and a possible lack of confidence in one's own understanding of technology (Awalt, Lawler, & Blake, 2012). Additionally, the lack of exposure to these forms of technological advancements may have caused teachers to develop negative beliefs in relation to the integration of ICT into their teaching as a whole. Therefore, Plowman and McPake (2013) have suggested that educators should be given more experience with technology. Furthermore, Roach (2010) has also asserted that teachers generally do not utilise technology in their classrooms due to the lack of training. Therefore, providing teachers with training in technology is essential, as they will be able to manage learning and teaching more effectively (McKenzie et al., 2018; Marsh et al., 2017). In the training, teachers should be taught to manage, use, and adapt to technology to ensure that they will utilise to the fullest extent the technological facilities that schools will provide them.

Sub-subtheme 2: Teachers being more comfortable with technology. Many teachers in this study stated that they are comfortable with technology, but some said they are not due to their lack of experience. Increased familiarity with technological devices will enable teachers to use these effectively in their lessons. One insight shared on this topic was:

Knowing how to use technological devices and programs has helped me feel comfortable when using technology, but of course, if we do not know how to use the device and how to control the children while they're using it, then there will be an issue.
[P9, north region]

It is evident that teachers in their classes need ongoing help in terms of technology. Factors include the limited number of staff that provide teachers with technical support in schools, the lack of capacity to provide teachers with instant support as required, the lack of a sub-structure, physical conditions, and the quality of the teacher's capabilities. Consequently, many teachers in their classrooms cannot use technology efficiently. Taking from related literature, findings from earlier studies show that teachers are prepared in their classrooms to utilise technology when technology fits with the curriculum and when proper plans are drawn up for effective, constant support for the use of technology (Purcell et al., 2013; Storz & Hoofman, 2013; Inan & Lowther, 2010).

The teachers' level of formal education does not affect how they implement technology in the classroom because it really depends on the teacher. If she loves technology, she will learn how to use it and implement what she has learned. It's the same as with the children; if they love it, they will be good at it. [P6, west region]

Research says that many teachers in kindergarten have difficulties adapting their values and beliefs to current and creative pedagogical techniques (Sheffield, 2011; Gray et al., 2010). In this context, the literature shows that the inclusion of technology into teaching and learning is often influenced by teachers' perceptions and techniques (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). Generally speaking, teachers' belief in the practice of ICT in a classroom is often hindered (US Department of Education, 2010). Teacher opinions on the importance of ICT have furthermore been established as related to teacher pedagogical thinking (Karaca et al., 2013; Lindahl & Folkesson, 2012; Nathanson et al., 2013). Even if it is possible to help early learning and development by including ICT in kindergarten, many teachers are battling to integrate technology into their classroom practice (Purcell et al., 2013; Storz & Hoofman, 2013; Inan & Lowther, 2010). It is therefore stated that teachers are reluctant to employ ICT if developing technologies are not suitable for the purpose of educating, learning, or playing in a pre-school setting (Blackwell et al., 2013; Anthony & Clark, 2010; Stanhope & Corn, 2014).

I sometimes face some barriers when I use the computer. For example, I sometimes can't play the video when I send it via e-mail. I don't know why. That's very restricting.
[P3, east region]

In this study, teachers stressed that the majority of their students used technological tools or surroundings better than themselves. In this sense, students aiding their teachers in the use of technology is an unavoidable answer for teachers. In order for teachers to be able to use technology, the solutions that they offered included support from students. This allows teachers to strengthen the contact between them and their students and lessen their fear about technological use during their lectures with the assistance of students. According to the

literature, technological integration into education may be accomplished by regular contact between teachers and students, which facilitates technology usage and teaches students how to utilise technology effectively. Technology-enabled interactions between teachers and students might result in the efficient incorporation of technology (Aseri, 2018; Kara & Cagiltay, 2017).

Personally, whenever I encounter a barrier when I'm using technology, I look for a video that helps me get past the barrier. For instance, I go to YouTube to learn about some programs or even fix some technical issues. When we were preparing for the school ceremony, I needed to merge the music with the PowerPoint presentation, and I didn't know how to do that, so I looked for an educational video on it and followed the steps. I was able to merge the song with the PPT presentation with the few steps that I found online. [P2, east region]

Teachers encounter many challenges when they use technology for teaching. However, by becoming more used to technology, teachers can become more comfortable with it and will be able to resolve some issues themselves, as they will eventually acquire the skill sets needed to do so (Aseri, 2018; Gahwaji, 2016; Kara & Cagiltay, 2017). Cox et al. (1999) have suggested that there are various factors that promote the utilisation of technology, specifically in relation to teaching, as the researchers conducted a study with a sample of 44 male and 28 female teachers who utilised technology in their lessons. Furthermore, by becoming more comfortable with technology, teachers will eventually learn how to support students' learning and enable them to gather information about students' progress and achievements (Hsu, 2016). Therefore, familiarity with technology can ultimately empower teachers to utilise programs effectively in the classroom which can improve their teaching (Moss & Beatty, 2010).

5.8 Normative Beliefs

The results of the interviews revealed kindergarten teachers' normative beliefs that parents should be involved in their children's learning (Q1).

5.8.1 Main theme 5: Parents should be involved in their children's learning (Q1).

It is crucial for parents to be involved in their children's education and to know what their children are being taught in school. This will enable them to support their children's learning even at home.

Subtheme 1: Home learning. Home learning is crucial to ensure that children progress in their learning even within the home environment and not only in school. In addition, through home learning, students can catch up with their schoolwork if they miss any lessons with the help of their parents.

Sub-subtheme 1: Additional learning. According to the teachers in this study, some of their students are behind in their learning, and some are ahead. Thus, by using technology, teachers can assign additional tasks for all their students to ensure that children gain information that is suitable to their learning level and improves it because technologies are useful for differentiating tasks and activities to promote inclusion. This means that children should be guided by their teachers in developing the skill of self-learning, which is a vital factor, particularly in the later stages of children's education. One teacher shared this insight:

I can see that children know a lot about computer games, so as an additional task, I sent their parents some links to games that were relevant to the work we were doing in school. [P9, north region]

There is a wide variety of research in schools or classrooms on the use of digital technology and among teachers and students; however, these studies often focus just on one or

two educational and technological phenomena (e.g., classroom cases or teacher and student technical skills) which isolate study subjects from the wider context of a school. There is also the prospect of sustainable innovation programmes creating a broader perspective in efforts to improve a school (Wartella et al., 2013; Ertmer & Ottenbreit, 2013). The connectivity between the implementation of ICT and educational changes has also been examined (American Academy of Pediatrics, 2013; Bell, 2010; Mertala, 2019). Various studies determined that there was an interaction between organisational initiatives and educational interventions to make changes to the education of the students. Studies have also developed a novel model for the community of schools, which focuses on four components: learning environments for students, professionalism for teachers, leadership, and partnerships, with each factor being vital for promoting educational innovation in the diverse use of digital technology (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). The model is broad, leaving much space for interpretation in the assessment and improvement of present procedures at the institution. In this context teacher reported that the intervention of the MoE in providing programs which aid to have additional learning for children which means there are external and internal drivers to promote teachers' use of technologies.

Technology improves many skills, such as reading, writing and math. There are programs that help children improve these skills that were designed by the Ministry of Education. They contain all the curriculum lessons and questions with their answers. Also, there's a reading app approved by the Ministry of Education that can help improve children's reading skills with the use of technology. By using technological devices, children can do extra learning on their own, which is crucial, especially for children who struggle to learn in class or are behind due to prolonged absence. [P10, north region]

Technology includes tools that should be employed in the classroom to support the improvement of children's skills. For instance, I can create activities to support my teaching of the concepts I have to teach the children. I can do this by making the children play some games that will help them learn math by showing them how addition works, and that will enable them to significantly improve such skills. I also send links to the games we play in class to the children's parents so they can also play them at home. [P13, south region]

Children from one to four years of age were able to learn using innovative technology and haptic gadgets. Children with such technology can use the alphabet, learn new vocabulary, improve their language skills, and enjoy playing, drawing, and creating scenarios. The motion of the fingers involved in using touchscreens is connected with what psychologists characterise as a form of reality representation through gestures in the absence of symbols or words (Crompton & Keane, 2012; Pynoo et al., 2013; Wood et al., 2013). Cooperating with a child in the use of technology also presents parents with an opportunity to show interest in what the child does (Fullan, 2007; Parette et al., 2010).

I let the children use technology because it allows them to do useful activities and copy or draw pictures on their iPad. This allows the children to learn in different ways. I also send the parents URLs of videos their children can learn from even at home. [P14, south region]

Technology can help improve children's skills in everything, such as reading and math. For instance, it can help the children learn how to write letters and numbers and

identify colours. Technology can also be used to play songs for children. I play videos during the lesson that will help improve the children's listening and memorising skills. When I project activities on the screen, whether for reading, writing or math, the children are usually very engaged. Just recently, I had a parent who texted me about her wanting her child to learn more outside the school, so I sent her some resources through a school classroom app. [P5, west region]

Technology reforms the emotional life of children, and we as adults want our children to learn and experience social connections (Bakkenes et al., 2010; Bebell & Kay, 2010; Bidwell, 2014). Proponents of technology hope for a scenario where robots can cater to their children, and while this may sound like something out of science fiction, to some degree, it has already started in its own way with the use of mobile devices and laptops (Facer, 2012; Chetty et al., 2011; Donnelly et al., 2011). The use of technology, whether for entertainment or educational purposes, comes with a number of advantages. Making use of technology is one way to foster creative thinking, problem-solving skills, and visual thinking, as well as to make education more enjoyable.

Technology can help improve children's skills, such as problem-solving, for example, by showing a picture with a specific problem on the screen using a projector to make the children think about how to solve it and discuss their ideas. Self-learning skills can also be promoted through computer classes because this will allow the children to be able to learn things relevant to their lessons even when they're home. [P16, south region]

Technology can promote self-learning among students (Czerniak et al., 1999; Couse & Chen, 2010). Nevertheless, in developing countries, there are not enough third-party self-learning applications. As such, there is heavy reliance on the applications provided by governments (Levin & Wadmany, 2006). It is crucial for children to utilise such applications as these will help improve their critical thinking and will allow them to become more independent (Hsin et al., 2014; Hsu, 2016). Developing children's critical thinking and problem-solving will enable them to change their behaviour when and how it needs to be changed and can help to improve their performance in the classroom. Therefore, it can be argued that, with increased demand, applications should be developed to ensure significant improvement in the skills of the pupils in developing countries.

Sub-subtheme 2: Fun learning tasks. Most of the teachers in this study said that they assign online homework to their pupils not only to save resources such as paper, but also to ensure that the parents will be able to access their children's tasks and help them with these if there is a need for such. The same teachers said that they inform the parents of the online homework they have assigned to their children via text messages or the Saudi Ministry of Education application, which allows access to resources that can help students complete assigned tasks. One teacher shared the following:

Personally, I send homework through an app that we have in school, but I think it would be good to have a school website so we could effectively apply technology to education because the children could find everything on the school website. As a teacher, I download e-books, and a school website would allow my students to easily access them. For my kindergarten class, I can download my weekly plans, homework, attendance and absent student sheet, so I can revise them, but if we had a school website, I could provide the parents with all the needed resources so they could help their children learn

further at home. I could also inform them about their child's attendance and homework.

[P15, south region]

Students that moderately use the Internet for homework were better academically than students who too often or too rarely use the Internet for homework (Kumpulainen & Sefton-Green, 2019; Project Tomorrow, 2011). Many elements might influence the student's learning outcome through digital homework. Critical thinking is always the key to success in using learning technology (US Department of Education, 2010). Digital homework aids children by effectively leading educators and parents to maximise the use of ICT for learning. In the form of digital homework, for instance, students can be more interested in homework, which can in turn raise their effectiveness in presenting jobs and can afford the teacher more efficiency in providing feedback (Cleveland & fisher, 2014; Bakkenes et al., 2010).

We send the children's homework to them as text message attachments because we don't have the training to send it through the Ministry of Education online facilities. When I send the homework through a text message, it helps the children become more familiar with technology, which will help them throughout their education because high school and university students usually use iPads for their schoolwork. Also, through technology, children can download e-books instead of using physical books. For example, they can download an e-book we have in school that they like and read it with their parents. [P6, west region]

Technology allows teachers to set up schoolwork in advance and in an effective manner (Kumpulainen & Sefton-Green, 2019; Project Tomorrow, 2011). The use of the learning management system to set homework online broadens the otherwise confined area of activities

that would be ordinarily available via paperwork (Karaca et al., 2013; Lindahl & Folkesson, 2012; Nathanson et al., 2013). A teacher may want to establish an interactive questionnaire or to construct a voting system to involve pupils sooner. A student can use any resources that a teacher selects, and the students themselves can add easily to the platform (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013). Online homework tasks can be adapted to individual and specified groups of pupils. This allows educators to provide important input even outside the classroom, and in real-time (Eteokleous, 2008; McManis et al., 2012; Jennings et al., 2009). Feedback can be provided, and marks can be made in whichever way benefits both the student and the teacher the most (Svensson, 2013; Lemke et al., 2009; Hernwall, 2016). Teachers can also offer audio or video comments in addition to the standard annotations of marks—this saves time and helps facilitate one-to-one attention between students and teachers (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013). The ability to track the progress of individual students is a clear advantage of such a working approach versus traditional techniques (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013).

In our school, we use technology to send the children their homework through their parents via text messages or sometimes e-mails. The homework usually consists of a form to be filled out online, but I sometimes include interactive tasks on separate websites I've found so that the children can do some extra work because they're usually up to the task. [P17, central region]

We send work to the children every week via e-mail. This counts as their homework. This is usually a task that they have to accomplish alone, but I sometimes give them support by explaining it to them in class. [P16, south region]

Online homework has caught the interest of schools all over the world as it provides students with the required resources for accomplishing tasks and gives them the opportunity to engage in self-learning (White, 2015; Aljabreen & Lash, 2016). Therefore, unlike other ways of providing homework, doing so with the use of technology can develop children's reading and problem-solving skills because students will have to search for applicable resources that can help them accomplish their homework through the Internet (Hassell, 2016; Mendham, 2014; Outhwaite et al., 2017). This means that not only can the children accomplish their homework, but they can also become more independent, which can prove to be greatly beneficial for the students in the classroom setting (Czerniak et al., 1999; Couse & Chen, 2010). As a consequence of teachers' use of technology to monitor their children's development, additional possibilities for students to demonstrate their learning and reflect on their work recently emerged (Adkins, 2021; Cerniglia, Cimino & Ammaniti, 2021). (Adkins, 2021; Cerniglia, Cimino & Ammaniti, 2021). Having students take videos and photos of their work was welcomed by both the teachers and their students. Children's photos and videos were utilised as anchors by teachers to inspire student reflection and assist students in making sense of their work, according to the teachers who used these goods. Teachers have seen that sharing with their children to collaborate on their projects increases their sense of learning in their accomplishments and improves their self-esteem. The school-home connection was strengthened when teachers shared their work with parents and caregivers (Adkins, 2021; Cerniglia, Cimino & Ammaniti, 2021).

Subtheme 2: Support from home. Through their involvement in their children's education, parents can become more aware of what their children are learning and can communicate to teachers any concerns they may have. Therefore, by becoming immersed in their children's learning across home-school contexts, parents can become more supportive of their children and can teach them more effectively.

Sub-subtheme 1: Training parents to teach their children from home. Parents and teachers should be trained to help children develop the ability to learn at home and to thus enhance their achievement in class. Therefore, by training teachers to provide their pupils with additional tasks and to monitor their pupils' accomplishments, they can help their pupils improve their learning. The following insights were shared:

We need to be trained to use the available facilities from the Ministry of Education, such as online homework settings and teaching parents to use these facilities. [P3, east region]

Online learning through the use of digital technologies is part of the 'multimodal life world' of young children and therefore it should be contextualised and capitalised upon to support teachers, parents, and children in developing agency via a form of multimodal practice through the best use of digital and online technologies. The viewpoints of the parents remain under-explored, and all of these arguments have been presented from the perspective of scholars and educators (Hassell, 2016; Mendham, 2014; Outhwaite et al., 2017). Parents have played a key role in their child's immediate environment by giving young children digital technology and access to various media. Opinions and attitudes of parents on the role and the possibilities of young children's online learning can influence the quality and quantity of their home learning, their exposure to opportunities, and their learning experiences (Czerniak et al., 1999; Couse & Chen, 2010). One teacher argued that:

Technology facilitates many things in teaching. For example, it has allowed me to assign online homework. Not all teachers can do this, though, so I would recommend training in this for us teachers and for the parents. [P2, east region]

Teachers can use technology and beneficial digital tools to extend student learning opportunities and enhance assistance and engagement for children (Purcell et al., 2013; Storz & Hoofman, 2013; Inan & Lowther, 2010). Teachers can also improve teaching methods and customise learning. Schools can profit from technology through reduced prices of physical training supplies, improved efficiency of training programmes, and optimised use of teaching time (Penuel et al., 2012; Wachira & Keengwe, 2010). Teachers can stimulate the curiosity of children through engagement and educational material, which research shows is linked to academic performance (Vockley & Lang, 2011; Stephen et al., 2013). The technology of education can encourage cooperation. Teachers can speak not just with students during lessons but also with each other. Students can similarly work together to solve difficulties through online lessons and learning games (Lynch & Redpath, 2014; Lui, 2012; Blackwell, 2013). Students can share and encourage one another in their collaborative activities and can express issues concerning the classroom and request support on hard topics (Bakkenes et al., 2010; Bebell & Kay, 2010; Bidwell, 2014). Even at home, students can upload their homework, and teachers can access finished jobs using their laptops and view them (Cleveland & fisher, 2014; Bakkenes et al., 2010).

Training us to use technology will be very helpful as it will facilitate many things for me. For example, it takes a long time to come up with homework for the children, but there are many pre-made tasks online that can be assigned as homework. [P10, north region]

I believe that technology can improve teaching through the use of electronic materials.

I want to be able not only to show electronic materials to my class but also to assign digital homework, but I can't do these without the correct training. [P12, north region]

It has been suggested that technology promotes innovation in teaching, which in turn helps in developing the objectives and contents of the curriculum (Sugarman & Willoughby, 2013). Furthermore, technology facilitates and reduces resource consumption when planning lessons. For instance, the use of digitalised homework is a major way of allowing parents to become more familiar with what their children are learning and to be more hands-on in supporting their education (Czerniak et al., 1999; Couse & Chen, 2010). Therefore, training teachers to use technical systems and teaching parents how these systems are utilised can provide increased opportunities for children to learn more effectively (Hassell, 2016; Mendham, 2014; Outhwaite et al., 2017).

Sub-subtheme 2: Additional teacher sessions at home. Teachers should be trained to help children even away from the classroom through digital meetings so even if the child is away, they can continue their learning as usual. Therefore, by training teachers to conduct online sessions, pupils can see that teachers truly care about their education and want the child to develop in and out of school. Accordingly, the following was shared:

Due to the learning process of using technology, it is now important for children to learn more than they did before. For instance, children should learn additional skills outside the classroom, and we as teachers should support them every step of the way. [P15, south region]

During the last decade, online learning increased quickly because of the higher timing, location, and speed of the accessibility of technology, which facilitated efficient access to a wider range of knowledge and reduced financial costs (Fullan, 2007; Parette et al., 2010). In a globalised digital era, government organisations, educational institutions and enterprises throughout the world promote online learning, which results in a transformation from traditional face to face classes to distant and online learning (Crompton & Keane, 2012; Pynoo et al., 2013; Wood et al., 2013). Online learning can offer a rich learning environment through the promotion of new communications technology and can enable and facilitate collaboration between students (Fullan, 2007; Parette et al., 2010). On the other hand, researchers have still voiced worries about the quality of online education and highlighted major problems with the creation of a high social presence and commitment to the online learning community (Sheffield, 2011; Gray et al., 2010). In addition, several researchers have also expressed concerns about key online learning problems such as social isolation, lack of connection and involvement, and delayed or insubstantial feedback (Almekhlafi & Almeqdadi, 2010; Plowman, 2015; Sincar, 2013). Yet, the opinions of interviewees were more positive. Some stated that:

Using technology has many benefits. For example, in my class, I usually meet with parents and their children using zoom, which I see is more efficient because it means parents would not have to come back to school to actually meet me, and through this, I can help the children virtually [P8, north region]

In my opinion, technology makes teaching easier because it simplifies the topic that needs to be explained to the children. Using a video call, I could communicate with the

students, which can allow me to help them with anything they do not understand effectively. [P13, south region]

Technology can also help develop children's cognitive skills, such as their long- and short-term memories (Mendham, 2014; Schacter & Jo, 2017). However, teachers must ensure that students are supported effectively even outside of school and are given a chance to seek extra support (Roach, 2010; Whittingham, 2013). Accordingly, students must be provided with lessons when they are away from school (Wohlwend, 2015; Alghamdi, 2016; Al-showaiby, 2010). Accordingly, the outcomes in the literature are to an extent similar to those of this study in relation to having virtual meetings to ensure students are up to date with their work.

5.9 The relationships between and across the five main themes

In the findings chapter, it is important to clearly understand the relationships between and across themes identified in the study. Themes are often interconnected and overlap, and it is essential to show how they relate to each other to provide a comprehensive picture of the research findings. To establish relationships between themes, researchers often use sub-themes or sub-categories that represent different aspects of a theme. These sub-themes can then be compared and contrasted across themes to identify connections and overlaps. It is also useful to use examples or quotes from participants to illustrate how the themes are connected and to provide context for the findings.

Furthermore, researchers should consider the theoretical frameworks or concepts that underpin the themes and how they relate to each other. This can help to identify any underlying assumptions or perspectives that may have influenced the study's results. Overall, the relationships between and across themes are crucial for understanding the complexity of the research findings and for developing a more nuanced understanding of the research topic.

The main themes of teachers' beliefs about technology in teaching children in Saudi Arabia are interconnected and overlap in various ways. Teachers' behavioural beliefs that technology can enhance learning and support teachers are related to the normative belief that technology is widely available. This means that teachers are more likely to utilise technology in the classroom if they believe it will have a positive impact on student learning and if they have access to the necessary technological resources.

Similarly, the theme of control beliefs includes, for example, the belief that technology is too complex or time-consuming to use or that it can be a distraction to students. These themes are also interconnected and overlap with each other, as teachers who believe that technology is too complex to use may also believe that it can be a distraction to students. On the other hand, the control belief that technology is a barrier to education may hinder the implementation of technology in the classroom. Teachers who believe technology is difficult to use or detracts from learning may be less likely to incorporate it into their teaching practices.

The theme of normative beliefs includes themes such as the belief on the involvement of parents in their children's learning and that technology is widely available. These sub-themes are also related to each other, as teachers who believe the involvement of parents in their children's learning may also believe that technology can provide opportunities for parental involvement. The normative belief that the involvement of parents in their children's learning is also related to the use of technology in the classroom. If parents are supportive of the use of technology in education, teachers may feel more comfortable incorporating it into their teaching practices. Additionally, technology can provide opportunities for involvement of parents in children's learning, such as through virtual parent-teacher conferences or online learning resources.

Overall, the themes of kindergarten teachers' beliefs about technology in teaching children in Saudi Arabia provide a more nuanced understanding of the relationships between and across the main themes. Understanding these relationships is important for developing effective strategies for promoting positive attitudes towards the use of technology in education and overcoming potential barriers to its implementation. Overall, teachers' beliefs about technology in teaching children in Saudi Arabia are shaped by a combination of behavioural, control, and normative factors. Understanding these relationships and overlaps is important for developing effective strategies for integrating technology into the classroom and promoting positive attitudes towards its use in education.

5.9.1 The relationships between and across the main themes one and five and their subthemes to answer RQ1.

The integration of technology into education has been a topic of interest for researchers and educators worldwide. The utilisation of technology in education has the potential to enhance learning outcomes by providing students with interactive and engaging learning experiences. The kindergarten stage is a critical period in a child's life that lays the foundation for future learning. This study explores teachers' beliefs regarding the implementation of technology in the teaching of kindergarten children in Saudi Arabia. The theme of this study is that technology can enhance learning, while the subthemes include the utilisation of classroom technology, curriculum ease of learning for children and supporting teachers in delivering lessons without extra effort. The research methods enabled links to be made between teachers' beliefs, their descriptions of their classroom practice, and the contextual factors that enable or inhibit the integration of technology. Regarding the relationships between theme and subthemes, the theme of this study, "Technology can enhance learning," is broad and encompasses various subthemes that relate to the implementing technology in an education setting. The subthemes "Use of technology in the classroom setting," "Curriculum ease of

learning for children,” and “Supporting teachers in delivering lessons without extra effort” are interrelated and connected. The first subtheme, “Use of technology in the classroom setting” is concerned with how technology is integrated into the classroom environment to enhance learning. The sub-subthemes under this category are “Make compatibility with lessons delivered to children” This sub-subtheme explores how technology can be used to create learning materials that are compatible with the lessons delivered to children. For instance, teachers can use interactive multimedia materials that match the curriculum to make the learning experience more engaging and meaningful for children.

The second sub-subtheme under “Use of technology in the classroom setting” is “Make curriculum ease of learning for children.” This sub-subtheme focuses on how technology can be used to simplify the curriculum for children. For instance, teachers can use educational games and apps that are designed to teach specific concepts in a fun and interactive way. This approach can help children understand complex concepts more easily and increase their motivation to learn. The third sub-subtheme under “Use of technology in the classroom setting” is “Supporting teachers in delivering lessons without making the extra effort.” This sub-subtheme explores how technology can be used to support teachers in delivering lessons more efficiently. For example, teachers can use some apps or websites to explain concepts in the lessons by using some videos or pictures that helps children to understand the lesson easily. Also, teachers can use digital platforms to communicate with parents, provide feedback on student progress, and collaborate with other teachers and discuss some issues about teaching or about the lessons, and they can help each other to work on some ideas that help to explain the lessons to children. In conclusion, this study explores teachers’ beliefs regarding the use of technology in the teaching of kindergarten children in Saudi Arabia. The theme of this study is that technology can enhance learning, while the subthemes include the use of technology in the classroom setting, curriculum ease of learning for children and supporting teachers in

delivering lessons without extra effort. The subthemes are interrelated and connected, with the use of technology in the classroom setting being a crucial factor in enhancing learning outcomes for kindergarten children.

Themes, subthemes, and sub-subthemes are hierarchical levels of organization used to categorize research findings. In this case, the main theme is that technology can enhance learning. The subtheme is that technology is the future in education, which is supported by three related sub-subthemes: jobs require technology, the evolution of technology, and technology being important for the upcoming generation. The sub-subthemes are specific examples that support the subtheme. In this case, jobs requiring technology emphasize the practical implications of using technology in education. The evolution of technology emphasizes the need for teachers to adapt to changing technology. Technology being important for the upcoming generation emphasizes the significance of technology in the lives of students.

Furthermore, there may be overlaps and connections between the sub-subthemes. For instance, the sub-subtheme of jobs requiring technology may also support the sub-subtheme of technology is important for the upcoming generation. This is because teaching students' technology skills from an early age can prepare them for future job opportunities. Similarly, the evolution of the technology sub-subtheme may be linked to the jobs requiring the technology sub-subtheme, as new technological advancements can create new job opportunities. Exploring teachers' beliefs with respect to the use of technology in the teaching of kindergarten children in Saudi Arabia can provide valuable insights into how technology is currently being used and how it can be effectively incorporated into the classroom to enhance children's learning. By categorizing these beliefs into themes, subthemes, and sub-subthemes, has identified patterns and relationships within the data.

The subtheme of “Improving children’s technological skills” is then further divided into two sub-subthemes: “Learning technology use early” and “Improved learning.” These two sub-subthemes represent more specific aspects of how technology can be used to enhance children’s technological skills. Overall, these different levels of themes, subthemes, and sub-subthemes help to provide a structured and organized framework for exploring teachers’ beliefs about using technology in the teaching of kindergarten children in Saudi Arabia. By breaking down the larger theme into smaller, more specific subthemes and sub-subthemes, researchers can explore the nuances and complexities of teachers’ beliefs in a more focused and detailed way. The themes and sub-themes identified in this study not only shed light on Saudi teachers' perspectives on technology use in teaching kindergarten children, but also provide insight into their own practice and potential inequalities in Saudi children's access to digital technologies. The subthemes related to Saudi parents' involvement in their children's learning, such as prioritizing home learning and providing additional learning opportunities, suggest that there may be gaps in the educational experiences of Saudi children, particularly those who may not have access to such resources at home. Furthermore, the identification of overlaps and connections between these subthemes highlights the need for a more holistic approach to teaching that takes into account not just the importance of technology, but also the parental roles and other factors that may impact children's learning experiences. Therefore, the themes and sub-themes in this study may serve as a beginning point for Saudi teachers allowing them to reflect on their own practice and explore ways to address any potential inequalities in their students' access to digital technologies and educational resources.

The present study aims that can be utilised to investigate the attitudes of Saudi teachers towards technology use in teaching kindergarten children in Saudi Arabia. The key focus of the study is to examine whether Saudi teachers perceive training parents to teach their children

from home and providing additional teacher sessions at home as appropriate strategies for enhancing parental involvement in their children's learning experiences. The primary finding of the study indicates that Saudi teachers emphasize the critical role of parental involvement in their children's learning experiences in kindergarten. The subtheme of "Support from home" was identified as a major theme that encompasses two sub-subthemes: "Training parents to teach their children from home" and "Additional teacher sessions at home." Both these sub-subthemes aim to address the need for parental involvement in their children's learning experiences. Nonetheless, the study also highlights that the Saudi teachers face several constraints, such as lack of time and resources, which might hinder the effective implementation of these strategies. Therefore, the suitability of these strategies in the Saudi Arabian context should be evaluated cautiously, taking into account the limitations faced by teachers in terms of time and resources.

It is important to acknowledge that there may be a disconnection between what Saudi teachers believe is ideal and what is feasible in terms of policy and practice. Although the study highlights the emphasis on parental involvement in children's learning experiences, the reality is that teachers face constraints in terms of time and resources, which may hinder the effective implementation of strategies such as training parents to teach their children from home and providing additional teacher sessions at home. Therefore, it is crucial to problematize the relationship between teachers' beliefs and their actual use of technology in teaching kindergarten children. Moreover, as noted in the study, teachers' positive or negative beliefs regarding technology use may influence their use of technology in teaching. By providing support to Saudi parents in their efforts to teach their children from home, teachers can promote a greater level of parental engagement in their children's education. This, in turn, may positively influence teachers' attitudes towards technology use, leading to increased adoption and integration of technology in teaching practices. Therefore, it is crucial to bridge the gap

between teachers' beliefs and their actual use of technology by addressing the constraints faced by teachers and promoting parental involvement in children's education. This could be achieved through targeted professional development programs, the provision of adequate resources and support, and collaborative efforts between teachers, parents, and policymakers.

5.9.2 The relationships between and across theme two and their subthemes and sub-sub-themes to answer RQ3.

Overall, understanding the relationships between and across the various subthemes related to technology as a barrier to education is critical in exploring the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children. By recognizing the potential challenges and benefits of technology use in education, teachers can make informed decisions about how to incorporate technology into their teaching practices. The theme identified in the study is that, for some teachers, technology is a barrier to education. The subthemes are technology offers distractions, technology use is less effective than traditional teaching in making children learn, and teaching children in the traditional way ensures the engagement of children is higher. The sub-subthemes are technology distracts children from learning, technology distracts teachers from teaching, teachers have more impact than technology, traditional teaching is more beneficial, technology has negative effects on children and their learning, technology cannot give direct answers, and technology is confusing to use.

The study employs themes and sub-themes to provide a comprehensive analysis of the nuanced and heterogeneous nature of Saudi educators' perspectives. The contrasting themes utilised in this research enable the identification of commonalities and divergences in the beliefs of the teachers, emphasizing that not all teachers hold the same views and are not likely to implement technology in the same ways. The sub-themes used in the study enable a more detailed understanding of the main themes and contribute to explaining the overall theme of

the investigation. For example, the sub-theme of technology as a source of distraction is supported by sub-subthemes such as technology's potential to distract the learning process. Similarly, the sub-theme of the relative ineffectiveness of technology-based instruction is substantiated by sub-subthemes emphasizing the benefits of traditional teaching methods and the greater impact of teachers compared to technology. Collectively, the themes and sub-themes converge into the overarching theme of "Technology as a barrier to education," which includes the sub-themes of technology-induced distractions, the limitations of technology-based instruction, and the advantages of traditional teaching methods. These sub-themes reflect the varied beliefs of Saudi teachers regarding the role of technology in kindergarten education. Through the use of contrasting themes, this study highlights the similarities and differences in these perspectives, revealing the complexity and diversity of Saudi educators' views on the use of technology in teaching kindergarten children.

Exploring the relationship between technology and education from the perspective of Saudi kindergarten teachers necessitates a critical examination of how subthemes and sub-subthemes overlap and interact with each other. If teachers view technology as a distraction from learning, they may eschew it altogether. Similarly, if teachers regard traditional teaching methods as superior to technology-based approaches, they may prioritize them over the latter. Nonetheless, the adverse impacts of technology on the learning process of children, such as bewilderment and the absence of prompt solutions, can also influence the perspective of educators towards the role of technology in the field of education. Furthermore, teachers' knowledge and understanding of how to use technology effectively and the availability of training and support can impact their willingness to integrate technology into their teaching. The overlap and interconnection of subthemes and sub-subthemes highlight the intricate and multifaceted nature of the relationship between technology and education. For instance, the

sub-subtheme of negative impacts of technology in relation to children's learning and the subtheme of technology use being less effective than traditional teaching both suggest that technology may not be the most effective tool for teaching children. Similarly, the sub-subtheme of technology's inability to provide direct answers is related to the sub-theme of technology's distracting nature, indicating that technology may not be the optimal way to engage children in learning. Thus, a critical examination of these subthemes and sub-subthemes is crucial for understanding the complex nature of the relationship between technology and education and informing the implementation of technology in the teaching of kindergarten children in Saudi Arabia.

In the context of utilising technology in teaching kindergarten children in Saudi Arabia, it is essential to recognize the importance of changes at the level of government policy and initial and continuing professional development for teachers. Saudi teachers cannot make informed decisions about the use of technology in their teaching practices unless they are exposed to professional development programs that change their beliefs and develop their skills and competencies. Furthermore, Saudi kindergarten directors need to be convinced to invest in technologies and the internet to support teachers in changing and enhancing their practice. Taking into account these factors, it can be argued that understanding the relationships between and across the various subthemes related to technology as a barrier to education is critical in exploring the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children. Teachers' beliefs are difficult to change, and changes in practice do not generally come without changes in beliefs. Therefore, it is crucial to recognize the potential challenges and benefits of technology use in education to make informed decisions about how to incorporate technology into teaching practices. The overlap between themes in the study also indicates the extent of change that needs to happen in preschools for digital technologies to be securely embedded in practice. The theme, subthemes, and sub-subthemes

in the study are interconnected and overlapping, providing a comprehensive understanding of the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children from kindergarten teachers' perspectives in Saudi Arabia. The findings suggest that changes in government policy and initial and continuing professional development programs can address the barriers and facilitate the employment of technology in education. Although technology can be useful in education, it also has limitations and can be a barrier to learning. Therefore, it is crucial for educators to consider these factors when incorporating technology into their teaching practices, and to receive the necessary support and training to do so effectively. In conclusion, changes at the level of government policy and initial and continuing professional development programs are necessary to support teachers in making informed decisions about the use of technology in their teaching practices and to ensure that technology is used effectively in the education of kindergarten children in Saudi Arabia.

5.9.3 The relationships between and across the themes three and four and their subthemes and sub-sub-themes to answer RQ2.

This theme is supported by the subtheme that technology is accessible in most households. This subtheme is further explored through sub-subthemes, which include Saudi children having experience in technology use, technology being useful, and Saudi parents being able to monitor their children's learning.

The study reveals a complex web of factors that influence kindergarten teachers' beliefs regarding technology use for educating children in Saudi Arabia. The sub-subthemes of Saudi children having experience in technology use, technology being useful, and Saudi parents being able to monitor their children's learning are all interrelated and suggest a cautious approach to technology use in the classroom. The familiarity and comfort that children have with technology due to their exposure from a young age, coupled with the perceived benefits of technology for enhancing learning and providing new opportunities for exploration and

creativity, underscores the importance of understanding the kinds of technologies that children have, or do not have access to in their homes. The need for parental involvement in children's technology use to ensure its age-appropriateness and beneficial impact on their learning, further emphasizes the need for teachers to be aware of the digital inequalities that may exist among their students. Therefore, teachers need to be knowledgeable about the technology resources that are available to their students outside of the classroom to create equitable and effective technology-integrated teaching practices.

In conclusion, this study demonstrates the importance of considering the relationships between and across themes, subthemes, and sub-subthemes when synthesizing the findings of the research. Through these relationships, a nuanced understanding of the factors influencing kindergarten teachers' beliefs about the use of technology for educating children in Saudi Arabia emerges.

Overall, the thesis demonstrates the interconnectivity between the main theme, subthemes, and sub-subthemes and how they contribute to the synthesis of findings on the factors influencing the beliefs of kindergarten teachers in Saudi Arabia regarding the use of technology in education. The analysis provides a comprehensive understanding of how the teachers in the study are using technology for planning and delivering lessons but also highlights the need for further education and training to ensure that teachers are equipped with the necessary skills to use technology effectively.

5.9 Summary

This chapter has shown the demographic characteristics of the 20 teachers interviewed. It has presented the findings of this study, which were elicited from the 20 interview transcripts using a thematic analysis technique. The categorised results show five themes, 11 subthemes, and 26 sub-subthemes. Subsequently, I have discussed the themes by comparing and contrasting each in connection with the methodologies and results of previous studies in the

literature. In relation to the themes of this study, the five main themes established were: technology can enhance learning, technology is a barrier to education, technology is widely available, technology supports teachers, and technology involves parents in their children's learning. While the semi-structured interview was completed, the findings revealed that the most often given responses were those regarding the kindergarten teachers' beliefs about facilitators and obstacles when using technology in the classroom to educate children. Teachers' behavioural beliefs about technology can enhance learning. (Q1) and Technology supports teachers (Q2+Q3). Control beliefs are associated with certain elements that may either assist or prevent the adoption of a given behaviour from occurring. The results of the interviews revealed kindergarten teachers' control beliefs about Technology is a barrier to education (Q3) and Technology is widely available (Q2). The results of the interviews revealed kindergarten teachers' normative beliefs that parents should be involved in their children's learning (Q1). Kindergarten teachers' Normative Beliefs about technology is widely available (Q2).

What are the beliefs of the kindergarten teachers in Saudi Arabia regarding the use of technology for teaching young children?

In summary, most teachers believed there were many benefits of using technology to teach young children. However, some harms were pointed out (children becoming addicted to technology), along with some disadvantages of implementing technology (for instance the lack of resources, internet access and time). Overall, it was argued that technology should be used in young children's learning.

What are the factors that influence the beliefs of the kindergarten teachers in Saudi Arabia regarding the use of technology for teaching young children?

In summary, it was argued that the main factors impacting the beliefs of kindergarten teachers on technology were mainly related to their past experiences with technology. Teachers with more experience with technology were more inclined to implement it, while those with less

training, or who worked in places with insufficient facilities, were more likely to have a negative outlook on technology implementation.

What do the kindergarten teachers in Saudi Arabia see as the barriers to, and facilitators of, their own technology use in teaching young children?

In summary, there were various barriers and facilitators of using technology. In particular, the main barriers were the lack of experience, the lack of resources and the lack of understanding on how technology is applied in the classroom. In terms of facilitators, having awareness of the advantages technology can have in the classroom, having technological facilities and having teacher training increase the use of technology in the classrooms.

With regards to the next chapter, I shall discuss the implications of the study and the future research recommendations.

6 Chapter Six: Conclusion, Practical Implications, and Directions for Future Research

6.1 Overview

In the conclusion chapter I briefly summarise the content of the previous chapters, though it will first begin with presenting the various key findings in the form of themes and subthemes with regards to the three following research questions: “What are the beliefs of kindergarten teachers regarding the use of technology with children in Saudi Arabia?” “What are the factors influencing the beliefs of kindergarten teachers on the use of technology for educating children in Saudi Arabia?” “What are the barriers and facilitators that influence the implementation of technology in the teaching of kindergarten children from kindergarten teachers’ perspectives in Saudi Arabia?” Subsequently the chapter will present the practical implications of this study for kindergarten teachers, specifically those in developing nations. Afterwards, the chapter will present the recommendations of the study followed by discussing its contributions and limitations. Finally, it outlines the conclusions of the study.

6.2 Key Findings

The key findings of this study were obtained using thematic analysis consisting of five themes, 11 subthemes, and 26 sub-subthemes which were elicited from the 20 interview transcripts conducted with kindergarten teachers in five different regions in Riyadh city. The interviews established that older teachers tend to find the utilisation of technology to be more difficult, and tend to have barriers towards using it, as they find traditional teaching to be an easier task. In addition, it was also established that not many schools train teachers in using technology, which implies not many teachers would be experienced enough to utilise educational technology. Similarly, teachers argued that technology supports their curriculum planning as it is seen as easier to use. However, poor technology availability in schools was argued to be the most significant barrier for teachers. In addition, the lack of software and lack

of promotion of technology in schools were further barriers. Therefore, as an implication, schools should attempt to improve on their practices and reduce these barriers to develop the education system for children. Improving access to the internet, and provision of devices would enable teachers and children to access the benefits of technology use in ECE settings.

6.3 Implications and Recommendations

There were many implications within this study that are important for teachers, schools, policymakers, and future research. These implications are increasingly relevant as ICT becomes integrated into education systems worldwide. These implications are discussed in the upcoming sections.

6.3.1 Implications for Teachers

This study provides many implications for teachers as they were the main focus of the research questions. The findings from this study have shown that teachers have strong beliefs about technology and want to integrate the devices within the education system. However, not all of the teachers in this study were able to utilise these technologies due to various barriers, including a lack of availability, a lack of training, and a lack of knowledge concerning technology. Accordingly, it is likely true that many of these teachers are untrained due to the education system not placing appropriate value on technology. However, as this study shows, teachers are able to realise that they can experience benefits such as an increased ability to plan for lessons and execute them in effective ways as technologies are new and sophisticated instruments within classroom environments. In addition, the findings of this study also indicate that teachers typically want to meet the needs of every student in the classroom without compromising the quality of lessons. Accordingly, this study may help teachers acknowledge the power of technology in allowing them to adapt their pedagogical approaches and monitor the progress of every student. Therefore, regarding teachers, this study is able to encourage

them to educate themselves and improve their teaching by employing technology within their classroom.

This study recommends that teachers' technological skills be developed significantly through the utilisation of special training sessions which are able to influence their perceived efficacy in the use of technology and improve their overall teaching effectiveness. Correspondingly, this study also recommends that teachers are committed to providing the best lessons through technology and changing their attitudes about integrating technologies into their practice. Finally, the study also recommends that teachers influence management to allocate resources for technology, including internet access, hardware and software, and train teachers in the effective use of technologies.

6.3.2 Implications for Schools

As well as teachers, this study has implications for schools—particularly for the management of schools, as they are responsible for identifying and employing innovative strategies within schools, such as frontline educational technology. This study is able to benefit schools as it provides them with an understanding of the potential challenges that can occur due to not employing technology. In addition, this study also allows schools to understand, from the point of view of teachers, the crucial importance of technology in the classroom setting, and why it should be integrated into classroom practice. Therefore, schools must understand that using technology is highly beneficial and would allow for curriculum and pedagogical innovations to occur.

This study recommends that schools begin integrating technological devices within their curricula. Furthermore, schools should consider utilising technologies such as tablets and computers to stimulate student participation and engagement. Similarly, the findings could also indicate how schools are able to apply the aspect of student-centred learning as a means of providing students with an ability to have some agency and choice in what and how they learn.

The study also recommends that schools allow teachers to develop positive attitudes when implementing technology through training and providing teachers with adequate resources for preparing the classroom environment. The effective use of technology requires consistent Internet access, in addition to employing professionals for immediate maintenance of any problems or obstacles that teachers face when utilising devices. Correspondingly, if teachers are able to utilise technology effectively, they can prepare teaching strategies that can actively engage their students, and in turn, they would be able to improve the critical thinking of students as well as their problem-solving abilities. On the whole, this study recommends that schools utilise management strategies that prepare teachers for change, such as by providing feedback and training, in order to ensure that teachers can adapt to technological changes.

6.3.3 Implications for Policymakers

As well as teachers and schools as a whole, this study provides implications for policymakers, particularly concerning school policies and how they are currently constructed to meet the needs of only some students. In particular, this study recommends policymakers to utilise technology as a way of ensuring that the ‘one-size-fits-all’ curriculum, which suits only some students, is altered and provides both teachers and students with more freedom when learning, thereby allowing for activities to be differentiated for inclusion. Furthermore, this study could also allow policymakers to realise that improvement should be enforced by the government to ensure that the education system improves continuously and becomes more modern in order for students to become more engaged and to learn more successfully. Regarding Saudi Arabia, this study would suggest the Ministry of Education to put in place further policies alongside Vision 2030 which ensure the accessibility and integration of technologies in kindergarten environment. In particular, the findings of this study also demonstrate that there may be various problems that must be accounted for before employing technology. For instance, policymakers could realise that there is a significant lack of resources

in technology, meaning there may be no budget for technology. Therefore, at the wider policy level, there must be more regulations established that ensure provision of funding for technology in schools. As a result, the evidence of this study has important implications, particularly in relation to targeting policies which seek to encourage and support the use of technology within the education system, including kindergarten. Additionally, policymakers should also explore issues that are specific to kindergarten teachers in the Saudi education system as these would allow the implementation process of technology to become simple and to have the most impact possible.

This study recommends that future policy focuses on teachers and how they are able to employ technology in the classroom effectively through training. In addition, for policy makers to set out effective regulations to integrate technology in schools, they must first understand that realistic policies are required over a period of time. As a result, this study recommends that the Saudi Ministry of Education should gradually implement technology in all areas equitably over a certain period of time to be consistent with the 2030 Vision and policy aspirations. Furthermore, policymakers should realise that they have a major role in the training of teachers, allowing them to improve teachers' skills, which in turn can allow for subsequent changes in the classroom. Correspondingly, these policy makers should ensure teachers have the opportunity for initial and continuing professional development to support innovative pedagogical approaches, particularly in relation to teachers' ability to monitor progress. Similarly, another implication is that the outcomes of this study are able to be utilised as a way of supporting policymakers in decision making, particularly those that are in similar circumstances in the research context. Accordingly, when integrating new technologies into educational settings, decision-policymakers should be aware of the diverse self-efficacy attitudes and experiences held by teachers, as current traditional teacher training and professional development constitute significant barriers to teachers' adaptation to technology.

6.4 Implications for Future Research

Despite the fact that numerous studies have explored the uses of technology in the field of education, there is still a lack of studies in the context of developing countries, particularly in Saudi Arabia and other Arab nations. Furthermore, there is also a lack of studies on the effectiveness of technologies like tablets, and on teachers' attitudes towards technology integration, the latter of which is what this study has explored. Nevertheless, there is still a need for further research on the perceptions of various other stakeholders—for instance, policymakers, parents, governors, managers, and even students in other areas of Saudi Arabia, as this study did not produce outcomes that could be generalised to the whole nation. Likewise, there could also be further research that explores the implementation of technology in both the public and private sectors, and in all school years rather than just kindergarten. Therefore, this study has likely encouraged further researchers to contribute to the literature around the topic of exploring the effectiveness of technology and the potential ways it can be implemented throughout the whole education system. Similarly, this study's methodological conclusion is that qualitative methodologies are effective in providing insights into teachers' beliefs and practices. Further insights might be useful into the lecturers' perspectives on this subject in initial and continuing professional development programmes.

This study recommends that there should be further research around the topics of technology within the whole school system, particularly in other cities and districts of Saudi Arabia. Similarly, future research should involve students, teachers, policymakers, or even governors from both public and private sector schools covering all of Saudi Arabia or even the entire Arab Gulf. Additionally, researchers might use mixed methods to examine teachers' beliefs and attitudes towards technology, and their classroom practices. Such research would provide the possibility to impact a wider audience of academics and subject-matter specialists that work for the Ministry of Education, namely policymakers and government authorities in

schools. As a result, future studies should also have an increased sample size, and should have a wider scope that includes many other potential variables that can play a role in the implementation of technology in the education sector, like the age of teachers, the length of work experience, the qualifications of the teachers, and the gender of teachers (to explore if there are any difference in the education of a teacher based on their gender and how this may impact teaching to gain a better understanding of this phenomenon). In particular, one area of research which should be explored effectively due to its inherent complexity is context (more specifically, the place where the study is conducted and how that can impact the outcomes). Additionally, given that this research was conducted in Saudi Arabia, it would be fascinating to learn about the variables that influence the implementation of technology in other education systems around the globe. It can therefore be suggested that future research should focus on the development of theoretical models to try and understand the implementation of educational technology by focusing on context.

Due to the COVID epidemic, there has been a significant increase in the use of online learning platforms in the classroom in the past two years, making it imperative that teachers have a deeper understanding of technological pedagogical and content knowledge (TPACK). The beliefs of teachers have a significant influence on their choices and the ways their knowledge is implemented in the classroom. This research explores how teachers conceptualise, learn about, and use TPACK. This aspect was explored through factoring on teachers' background knowledge, years of experience, and level of education. The outcomes have suggested that kindergarten teachers in Saudi Arabia place a high value on several aspects of TPACK when planning lessons and implementing pedagogical strategies for using technology to enhance their students' learning and development. Unfortunately, they have only been able to employ technology to a limited extent due to their contextual barriers and

inadequate training. In relation to teaching experiences, a high level of diversity exists in relation to the beliefs that teachers have. Particularly in subjects where technology was not used, senior teachers had greater levels of TPACK. In addition, newer teachers also reported feeling more prepared and confident to use technology in the classroom as it pertained to technological knowledge. Similarly, teachers with higher degrees were more likely to favour using technology into their lessons than those with lower degrees (BA). Based on the results, it is suggested that colleges and universities need to provide extensive training in the latest digital technologies for teachers, particularly for experienced teachers. Collaboration between novice and expert teachers is also advised since the former lack pedagogical techniques and the latter require greater technical help. It is crucial to provide teachers feedback on how they are using technology to improve their own digital literacy in the areas of content representation and knowledge transfer.

6.4.1 Draw attention on:

- 1- What technology is available?
- 2- knowledge of what Apps are available and suitable for children learning?
- 3- knowledge and a better understanding of how to support children's learning?
- 4- How to use technology and how to support learning.

6.4.2 What technology is available?

Saudi Arabia is one of the leading countries in the Gulf region when it comes to adopting technology in education. A wide range of technologies is available in the country, including interactive whiteboards, projectors, tablets, and laptops, which can be used to enhance teaching and learning in classrooms (Alharbi, 2018). Additionally, most households in Saudi Arabia have access to technology, such as smartphones and computers, which can be

used for learning purposes (Al-Qahtani & Higgins, 2013). Therefore, teachers can utilise these technologies to support children's learning both in and out of the classroom.

6.4.3 Knowledge of what Apps are available and suitable for children learning

With the increasing use of technology in education, many Apps are available that support children's learning. However, it is crucial to choose developmentally appropriate and relevant Apps that support children's learning outcomes (Chang, Chen, & Chen, 2018). For example, there are Apps that can help children develop literacy and numeracy skills, such as LetterSchool and Mathletics, respectively. Additionally, Apps like Duolingo can help children learn a new language. Therefore, it is essential for teachers to have knowledge of these Apps and choose those that are suitable for their students' learning needs.

6.4.4 Knowledge and a better understanding of how to support children's learning

Using technology in the classroom can enhance children's learning outcomes, but it requires knowledge and a better understanding of how to support learning using technology. For example, teachers need to use technology appropriately, minimize distractions, and integrate technology with other teaching methods (Chen & Cheng, 2019). Additionally, teachers need to provide guidance and support for children to use technology effectively, and this involves providing clear instructions, modelling, and feedback (Chen, Wu, & Chang, 2019). Therefore, teachers need to acquire knowledge and training on how to use technology to support children's learning effectively.

6.4.5 How to use technology and how to support learning?

Using technology in the classroom is not enough to support children's learning; teachers also need to know how to use technology effectively to enhance learning outcomes. Teachers can use technology to create interactive and engaging learning experiences, such as using educational games, virtual field trips, and online resources. However, it is essential to ensure

that the use of technology is aligned with learning objectives and that the technology supports the curriculum. Teachers also need to integrate technology with other teaching methods to create a balanced and comprehensive approach for learning. To support learning using technology, teachers need to provide guidance and support for children to use technology effectively. This involves providing clear instructions, modelling, and feedback, and promoting responsible and ethical use of technology. Teachers can also encourage children to collaborate and communicate using technology, promoting the development of social and communication skills.

Furthermore, teachers need to ensure that the technology used in the classroom is accessible and inclusive, meeting the needs of all children, including those with disabilities. This requires teachers to have knowledge and training on the appropriate use of assistive technology and how to create accessible digital content. In summary, teachers need to have knowledge and training on how to use technology effectively to support learning outcomes. This involves integrating technology with other teaching methods, providing guidance and support for children, promoting responsible and ethical use of technology, and ensuring that technology is accessible and inclusive.

In conclusion, Saudi kindergarten teachers need to have knowledge of the available technology, suitable Apps for children's learning, and how to use technology to support learning. With this knowledge, teachers can integrate technology in their teaching practice effectively and enhance children's learning outcomes.

6.5 Contributions of this Study

This qualitative study has various contributions to future research. The first contribution is that it has a rigorous protocol that could inspire further research on understanding Saudi kindergarten teachers' beliefs with respect to the use of technology in order to enhance the children's educational development. Correspondingly, the use of a

rigorous protocol may also lead to future researchers understanding how a high-quality sample can be obtained and how a detailed description of every case is able to be obtained by research (Benoot, Hannes & Bilsen, 2016).

In addition, another main contribution of the study is that it successfully employed forward-backward translation; this evidence of success can allow future researchers to effectively employ the same methods to conduct research in nations that do not speak English. Finally, the utilisation of a qualitative software package (NVivo 12) to facilitate the generating of themes may have increased analysis efficiency, trustworthiness, and transparency of the study, which would all lead to usefully accurate outcomes.

Braun and Clarke (2006) and King (2004) suggest that thematic analysis is an effective tool for understanding participants' viewpoints since it identifies parallels and contrasts and offers contextually situated discoveries. In addition, thematic analysis is also advantageous due to its ability to summarise large data sets and extract key features in a well-structured way that helps create a clear and organised set of outcomes (King, 2004).

As above, the present study makes both theoretical and empirical contributions. These include a possibility of creating awareness at the Saudi Ministry of Education, (ME) as these results will be available on the Saudi Digital library where they can be accessed by students, policy makers, and ME personnel. This study will also be sent to the head of the ME as it may contain relevant outcomes that can support the founding of new policies. Accordingly, the information produced in this study can encourage the use of technology as a tool in the education process of kindergarten children due to the fact that, as discussed in the research review, it can make the process of learning and teaching more efficient by simplifying content through, for instance, visualisation. Additionally, this research will enable Saudi Arabia's Higher Education Ministry (HEM) to concentrate and compress courses on the value of technology for university-level students studying early childhood education. Additionally, the

study emphasises the necessity of increasing technological knowledge in education via methods such as holding frequent training sessions for early childhood educators.

The global education system has faced considerable disruption due to the COVID-19 pandemic. Saudi Arabia was no exception, with the government implementing measures to curb the spread of the virus, including the closure of schools and the switch to online learning. This shift has led to an increased reliance on technology, which has challenged teachers' beliefs about its effectiveness and usefulness in teaching young children. This reflects on the impact of COVID-19 on teachers' beliefs regarding the use of technology with children in Saudi Arabia and the potential for further study. The COVID-19 pandemic has forced teachers to rapidly adapt to new teaching methods and technologies. This shift might lead to changes in teachers' beliefs about the use of technology with young children. Many teachers who were previously sceptical of technology's effectiveness have embraced it as a valuable tool for teaching and learning. This shift also has been driven by the need to provide remote instruction during the pandemic. The increased utilisation of technology in the classroom has resulted in teachers developing a higher level of confidence in their ability to use it effectively.

Alghamdi, Mostafa, and Abubshait (2022) conducted a study with the objective of examining the preparedness of kindergarten student-teachers in integrating technology into their future classrooms, as well as identifying the factors that influence their integration. To achieve this goal, a mixed-methods sequential explanatory design was employed, which involved administering a survey and conducting follow-up interviews with the participants. The results indicated that participants had positive attitudes toward technology integration, were ready to implement technologies, and believed that technology could help students understand new concepts. The study revealed that while there was a positive attitude towards technology use in the classroom, several barriers were identified. These included issues such as insufficient equipment, poor infrastructure, internet unavailability, and the number of students in the

classroom. The study did not specifically address unequal access to technologies in children's homes. Overall, the study emphasizes the importance of developing teacher technology readiness and improving school infrastructure to support effective technology integration in the kindergarten classroom.

The study's key findings revealed that the kindergarten student-teachers possessed a sense of self-assurance in their technical skills and were able to put them into practice. Furthermore, they believed that technology could serve as a useful tool to enhance students' comprehension of new concepts and to motivate and reinforce children's learning. Nonetheless, the participants encountered numerous difficulties, including the number of students in their classes, inadequate school infrastructure, and insufficient support from both school administrators and parents. Although the study did not explicitly concentrate on the issue of unequal access to technologies in children's homes, it did bring to light certain impediments that could limit the integration of technology in the classroom, such as poor internet connectivity and a shortage of equipment. Consequently, it may be argued that unequal access to technology outside of school could potentially hinder the effectiveness of technology integration in kindergarten education. Nonetheless, further research is warranted to explore this matter in greater depth.

Alghamdi et al. (2022) found that there is empirical evidence indicating that student-teachers in Saudi Arabia exhibit a favourable outlook towards incorporating technology into classroom practices. According to the study, the participants expressed confidence in their technical abilities and viewed technology as a tool for reinforcing and motivating children, as well as aiding their comprehension of new concepts. These results suggest that the teachers are open to use technology in their professional practice. However, the study also highlighted several challenges that could limit the integration of technology in the classroom, such as a lack of equipment and support from the school administration and parents. These challenges could

potentially hinder the adoption of technology by teachers. Additionally, the study did not specifically focus on whether or not the student-teachers were previously reluctant to use technology, so it is difficult to draw a definitive conclusion on this matter. Overall, while the study did not provide clear evidence of a decrease in reluctance to use technology among teachers, it did suggest a positive attitude towards technology and a willingness to integrate it into their professional practice. It is important to continue researching this topic to gain a better understanding of the factors that influence teachers' attitudes towards technology and their willingness to use it in the classroom.

The study conducted by Alghamdi et al. (2022) provides important insights into the challenges that kindergarten teachers in Saudi Arabia face when integrating technology into their classrooms. While the study did not specifically focus on the resourcing of technology centres to support technology in preschools, it did identify several key barriers that could limit the effectiveness of technology integration, such as a lack of equipment and internet connection, and the need for computer labs and active learning rooms. These findings suggest that preschool managers need to consider the availability and accessibility of technology resources when designing and resourcing their centres. Providing access to up-to-date technology and ensuring a reliable internet connection could help to support teachers in their efforts to integrate technology into their classrooms and enhance student learning. Additionally, it may be beneficial for preschool managers to provide training and professional development opportunities for teachers to help them develop the technical and pedagogical skills needed to effectively use technology in their teaching practice. In conclusion, while the study does not provide direct implications for preschool managers in terms of resourcing centres to support technology, its findings suggest that preschools should prioritize the provision of technology resources and support for teachers in order to enhance the quality of kindergarten education and prepare children for the digital age.

The impact of COVID-19 on teachers' beliefs about technology use in Saudi Arabia warrants further study. There is a need to understand how teachers' beliefs have changed since the start of the pandemic and whether these changes are likely to be permanent. This study could also investigate the impact of teachers' beliefs on student learning outcomes. Additionally, further research could explore ways to support teachers in effectively integrating technology into their teaching practice. The COVID-19 pandemic has challenged teachers' beliefs about the utilisation of technology in relation to young children in Saudi Arabia. This has reflected on the impact of the pandemic on teachers' beliefs and the potential for further study. According to the findings, teachers have gained more confidence in their capability to utilise technology efficiently in the classroom. However, there is a need for further research to investigate the enduring impact of COVID-19 on teachers' convictions and to assist them in integrating technology into their teaching effectively. Understanding these factors can provide insights into the barriers and facilitators that influence technology integration in the classroom. Secondly, research could explore the impact of COVID-19 on teachers' pedagogical practices and how technology can be used to support these practices. With the shift to online learning during the pandemic, there is a need to understand how technology can be used to support student engagement, motivation, and learning outcomes in a remote learning environment. Thirdly, future studies could examine the effectiveness of professional development programs aimed at supporting teachers' technology integration in the classroom. This can include exploring the impact of different training models, such as online courses, peer coaching, and on-site workshops, on teachers' beliefs and practices regarding technology integration. Finally, research could also investigate the impact of technology integration on student learning outcomes, particularly in the Saudi Arabian context. This can include examining the impact of different technology tools and platforms on student achievement, engagement, and motivation.

In conclusion, the qualitative study on Saudi kindergarten teachers' attitudes about technology in education provides insights into the factors that influence technology integration in the classroom. The recommendations for future research aim to build on these insights and further explore the impact of COVID-19 on teachers' beliefs and practices regarding technology integration. By doing so, future research can provide valuable insights into how technology can be used to support teaching and learning in the Saudi Arabian context.

6.6 Limitations

The limitations in relation to the qualitative approach can be summarised in relation to numerous aspects. Firstly, the fact that the study research participants were recruited from different schools in different zones based in Riyadh means that the teachers' perspectives about technology in kindergarten might not be the same as that of teachers in, for instance, the cities Jeddah or Dammam. Additionally, due to the fact that the study employed only 20 participants out of five different schools, the outcomes may not successfully represent the whole population of Saudi kindergarten teachers. Another limitation of this study was that the main themes and subthemes were based around the knowledge of the researcher as well as the analytical processes used, meaning some key themes and subthemes that could have been created may have been unintentionally disregarded. A further drawback faced in this study was the necessity of employing forward-backward translation as, despite its effectiveness in translating from Arabic to English, the translated transcript likely lost some original meaning, as some intercultural sentences may have been a mistranslation, or might simply translate poorly into the other language.

In the qualitative study, another drawback may relate to the identification of an effective methodological approach among the five main qualitative approaches; other approaches may have been more effective and may have provided more value for the semi-structured interview format. However, due to time constraints, other such approaches, or a mix

of approaches, were not possible. Additionally, a further limitation of this study was linked to the data analysis; namely, the fact that thematic analysis has not been researched as much as grounded theory, ethnography, and phenomenology. This may have affected the study's ability to host rigorous thematic analysis due to the inherent complexity of the relatively underutilised method of theming. Concerning the thematic analysis itself, its main disadvantage is that it does not consider language and the translation process, or that information could have been lost before analysis (Braun & Clarke, 2006).

On the whole, the limitations of this study can be assessed by considering the four main components used to evaluate overall reliability. These components are as follows: credibility, trustworthiness, participant rights, and confirmability. The credibility of the study is the first component of this list, and it is the process of evaluating whether the study has provided true and accurate information which correctly explores a phenomenon (Letts et al., 2007). In relation to this study, credibility in this instance was mainly based around the researcher's ability to establish themes and the ability to conduct interviews. To ensure that conducting interviews and establishing themes were not an issue, a pilot study was conducted. The second aspect was trustworthiness. This aspect was based on the quality of the interviews and whether or not the correct questions were asked to receive the required information. As a result, the majority of the questions asked to the participants were directly related to the main ideas surrounding the topic in question, which is the utilisation of technology in kindergarten. The next factor was considering the rights of the participants and how each question may affect them and their thoughts throughout the duration of the interview. Consequently, to avoid this limitation, ethical approval was granted for the study, deeming it ethically acceptable. Similarly, the rights of the participants were ensured, and each participant was facilitated to feel confident around the researcher. I additionally ensured that the participants read the information about the study and signed the consent forms to preserve their rights.

Furthermore, before the transcripts were utilised in the study, the participants were sent the transcript of their corresponding interview, and were given the option to add, remove, or modify any information they wished to amend. Finally, the last component is confirmability. This component assesses the study's ability to limit bias (Letts et al., 2007). Regarding this study, bias was reduced through various processes—for instance, a pilot study was utilised to ensure that the research procedures could be utilised effectively. Therefore, on the whole, this study was conducted effectively. However, there could also have been alterations that could have improved the validity and reliability of the outcomes; for instance, employing a different qualitative design (which were not employed in this study as they were found to be unlikely to answer the research question), or even employing a mixed-method approach (however this was not possible in this study due to the increased complexity of multiple methods, and the necessitation of a longer timeframe).

6.7 Summary

This thesis has explored and analysed kindergarten teachers' beliefs and attitudes concerning technology use in the classroom. Furthermore, this study focused on teachers' dispositions and perceptions on the same topic. I have suggested that this study not only contributes to existing knowledge based around the integration of technology in kindergarten, but it also has implications for researchers regarding the utilisation of information technologies within school classrooms in general, particularly with respect to teachers' awareness of the elements that might influence their views and attitudes about technology use.

In addition, through utilising technology in schools, policymakers who set out teacher training policies can aid teachers in developing technological skills, and cultivating positive beliefs, knowledge, attitudes, and perceptions towards the affordances of technology, and can all in all increase the ability of teachers to utilise technology in the classroom to allow students to achieve their true potential. As to the contrary, the qualitative findings also showed that

teachers' potential use of information technology was majorly impacted by their outlooks on the devices involved and technology's overall ability to transform the classroom. Outlooks and beliefs examined were particularly in relation to self-efficacy beliefs (for instance individual teachers' technological efficacy and collective efficacy), and student-centred beliefs (for instance teachers' ability to improve students' capabilities to become more independent). Correspondingly, the outcomes of the interviews suggest that despite the fact that schools attempt to enhance teaching and learning, some teachers are still not provided with adequate resources or training to be able to improve the education within their classrooms. Specifically, as suggested by teachers who were responsible for utilising these devices, most teachers have little to no previous experience with technology, so it may not be utilised to a great extent.

Due to COVID-19, the process of writing up the results and synthesising evidence took significantly longer than anticipated, as I returned to my home country during the pandemic as requested by the government of Saudi Arabia. Gathering references was also an issue as the library within the university could not be accessed in person, meaning online libraries had to be utilised. Furthermore, I was also unable to visit libraries in my home country (Saudi Arabia) as they were closed due to the COVID-19 pandemic. Additionally, another challenge I experienced was my children, as schools closed and day care centres in Saudi Arabia, meaning I had to take care of my children throughout the day. After initial re-opening, the schools were moved to an online platform, and thus the responsibility of ensuring that children were learning was shifted somewhat more towards parents, especially so during the three mid-term exams and three final exams for elementary schools for which my children had to study. The increased responsibilities necessitated exclusively working during the night, which may have hindered the research in its own right.

The whole study was guided by a qualitative protocol in the form of a semi-structured interview with teachers in kindergarten. Correspondingly, the study was carried out effectively;

however, as discussed, a focus on additional school contexts, such as primary or secondary school education, could have improved the study's scope. In addition, the study could have also recruited pupils, council representatives, and school management to develop a fuller understanding of the role of technology in the classroom. The study could have also had a mixed-method design, which may have been used to triangulate (using multiple sources of data to improve credibility) and integrate results, which would allow for a greater understanding of the topic.

As a researcher, I have gained many skills from conducting this study, as I have carried out interviews, recruited participants, transcribed data, conducted data analysis, and elicited themes from data to produce outcomes. Correspondingly, this has allowed me to develop a basic understanding of how research is conducted, allowing me to conduct more research in the future.

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7 Appendices

7.1 Appendix 3.1: A- Interview Guide (Research Tool)



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Research tool

Researcher: Maram Alawad will conduct this study under the supervision of Professor Jackie Marsh.

Research Project Title: Kindergarten Teachers' Beliefs about Using Technology with/by Children in Saudi Arabia.

Purpose of the study: This project is in partial fulfilment of my doctorate studies at the University of Sheffield, United Kingdom. This study aims to explore Kindergarten teachers' beliefs about the use of technology in the classroom and the factors that can affect its integration.

Research tool: Individual (face-to-face) interview.

The participants: Kindergarten teachers in Riyadh, Saudi Arabia.

Research procedures: Teachers will be invited to take part in interviews that aim to explore their points of view about the use of technology in the classroom and the factors that can affect its integration in the kindergarten stage.

Interview questions:

The questions will vary according to teachers' answers, but they all relate to the subject of the study, which is Kindergarten Teachers' Beliefs about Using Technology with/by Children in Saudi Arabia.

Duration: 26th December 2018 to 28th March 2019.

17/4/1440 AH to 21/7/1440 AH

Proposed questions for interviews:

Thank you very much for taking part in this interview. My name is Maram Alawad and as you have already read in the information sheet that I'm a PhD student from the University of Sheffield in the UK, working on research about kindergarten teachers' beliefs about using technology with/by children in Saudi Arabia. The interview will be voice recorded, but if you are unhappy about it, I can switch the recorder off. The interview will take about 40-60 minutes. You can withdraw from the interview any time you want without giving any reason.

Switch on the voice recorder

Warm-up questions

- Can you please briefly describe your educational background?
- Can you tell me how long have been teaching?
- Which age category are you in?
 - Less than 20 years old
 - 21- 30 years old
 - 31 – 40 years old
 - 41 – 50 years old
 - More than 50 years old

Subsidiary questions

- What comes to your mind when you hear the word “Technology”?
- Can you explain more what your understanding of the word “Technology” is?
- Do you use any technology devices in your daily life? Or not?
- If so, for how long do you use each device daily?
- What was the first technology device you used? How old were you?

- Imagine that technology has not yet been invented; would that affect your life? How?
- Do you think technologies have changed the way you live? Or not?
- When you were a student, did your teacher use technology in the classroom? If yes, how, explain? If not, do you wish if there were a technology in your classroom?
- Do you have any technology device in the classroom? (Computer, iPad, Tv, ... etc)?

**If
Yes**

- What kind of technology device do you use in the classroom? (Computer, iPad, TV, ... etc)?
- How do you use it?
- Do you let children use it, or not? Is it available for children in the free-play period, or not?
- Give examples of technologies you think are essential in teaching kindergarten children.

**If
No**

- What are the reasons for not having any technology in your classroom?
- Do you wish to have technology in your classroom?
- Give examples of technologies you think are essential in teaching kindergarten children.
- If you do have any access to a device, will you use it, or not? Will you let the children use it, or not?
- Do you believe that technology is important in the classroom, or not? If yes, what kind of technology do you think is important to have in the classroom?
- Do you think technologies such as computers can improve children learning, or not? If yes, explain how?
- Do you believe technology is a tool you could use to enhance curriculum planning or not? If so, how?
- Does technology make teaching easier or more complex? Explain how?
- Do you feel comfortable or nervous when you use technology in the classroom? Why?
- How can technology be implemented in teaching and learning in a more meaningful way?
- Does teaching by using technology foster critical thinking, problem-solving skills, and promote self-structured learning or not? If so, how?
- Do you believe technology creates a barrier between the teachers and the students? If so, how? If not, why not?
- Does technology increase or limit social interaction in the classroom?
- Does technology enhance or limit the relationship the teacher-parents and teacher-student relationships? How?
- Do you think that technology, such as computers, can help create collaborative work among children? If so, how? If not, why?
- Do you think technology can help to involve shy children or not?
- Do you believe technology impacts health negatively or positively? How?
- What are the benefits of using technology with/by children in the classroom?
- Do you think technology may affect children's future? How?

- How can technology allow more students to participate at a level that is suitable for them?
- What factors do you think have shaped your view of using technology with children?
- Do you think your beliefs shape your practice in any way, or not? If so, how?
- What have things in school helped to create a positive or/and negative attitude towards the use of technology in your schoolwork?
- How do you and your family use technology at home?
- Have you studied any course has related to technology or using technology such as the basis of using the computers, Microsoft, etc.?
- Do you have any certificate on technology?
- Do you think the teacher's level of formal education affects how they implement technology, or not? If so, how?
- Have you had a chance to get training on technology? If yes, how? Online self-training, required from school (training courses at or outside the school),
- If no, do you think you need such these courses? Why?
- Does training aid in achieving technology integration or not? If yes, how?
- Tell me about the challenges you face when you use technology?
- What are the barriers you face when using technology in the classroom?
- Do you think there are any problems to be faced in using technology in the classroom?
- Do you think the teaching experiences affect the use of technology at a kindergarten level or not?
- Do you think the teacher's age may affect her attitudes positively/negatively toward using technology in the classroom? If so, how? If not, why?
- What things can be provided to you to help you use technology with/by children?
- In your opinion, who can help support teacher use of technology in the classroom? How can they help?
- I think we have covered all the interview questions; do you have anything you would like to add?
- Do you have anything you want to ask me?
- I really appreciate your contribution to this study and as I mentioned in the information sheet that everything will be very confidential and anonymous. I will be pleased if you agree to contact you in the future regarding any clarifications about the interview topics.

Now, I will switch off the voice recorder.

Thank you so much and have a good day.

7.2 Appendix 3.1: B- Interview Transcript

	Content	Time
	<p>The researcher: Can you briefly describe your educational background?</p> <p>P: I have a Bachelor of Kindergarten, from King Saud University.</p> <p>The researcher: How long have you been teaching?</p> <p>P: One year</p> <p>The researcher: Which age category are you in?</p> <p>-Less than 20</p> <p>-21-30</p> <p>-31-40</p> <p>-41-50</p> <p>-More than 50</p> <p>P: 21-30</p> <p>The researcher: What comes to your mind when you hear the word “technology”?</p> <p>P: Developing, Modern things, progress in learning, things that can benefit society and us.</p> <p>The researcher: Can you explain more what your understanding of the word technology is?</p> <p>P: Technology facilities have become broad, especially in the field of education. For example, before the emergence of instructional technology, teachers would explain things but they’re not fully understood by the children because we couldn’t apply them to reality. Thanks to technology, however, we can already show things to children while explaining them. Even we as teachers can learn using technology as we can search and find things very quickly through the internet.</p> <p>The researcher: Do you use technological devices in your daily life or not?</p> <p>P: Yes</p> <p>The researcher: How long do you use it daily?</p>	<p>00:00:00</p> <p>-</p> <p>06:22:00</p>

P: Most of the time, I can say 50% of the time.

The researcher: What was the first technology device you used and how old were you?

P: I was 13 years old, and the device was BlackBerry.

The researcher: Imagine that technology has not yet invented. Would that affect your life?

P: If technology has not yet been invented, my life will not be affected because people before us lived their lives without technology.

The researcher: Do you think technology has changed the way you live? Or not?

P: Yes, a lot

The researcher: How?

P: Technology changed my views, approach and my interaction with people.

The researcher: How do you and your family use technology at home?

P: We rarely deal with technology at home. We use Mobile phones or TV the most.

The researcher: When you were a student, was your teacher using technology in the classroom or not?

P: Yes, a lot.

The researcher: What she used it for?

P: She used PowerPoint presentations to explain some of the lessons, and teachers wanted to do creative things with technology. They did not like old things or traditional methods of teaching. They wanted most things to be done by technology. They were happy when we brought devices such as iPad or something to show things.

The researcher: Currently, is there any technological device in your classroom?

P: Yes, there are computer, projector and sound system (speaker).

The researcher: How do you use them?

P: I use a computer connected to a projector to show my students some pictures or videos that would be impossible for me to show them in real life, such as how a volcano erupts. I just show it to them using technological devices.

The researcher: Do you allow the children to use them or not?

P: Not in my class, I, the teacher, am the only one who uses the computer. I connect it to the projector so I can show my students things related to our lesson, but I also use it to contact the parents. I ask them to take photos of their children when they behave well at home and then send these to me. I then display the pictures in the classroom for all the children to see. This will encourage the children to behave well at home.

The researcher: Is it available for children during the free-play period or not?

P: No, we do not have a computer specifically for children.

The researcher: What are your beliefs about using technology in the classroom?

P: I believe that technology is necessary in education because I expect all children have iPads, and because children nowadays use technology, we can get benefit of that and develop their skills by using what they like.

The researcher: In your opinion, what are the advantages and disadvantages of using technology with children?

P: Technology has many advantages. One is it helps expand children's horizons. It's an encyclopaedia that can help us find many things. However, there are also some disadvantages, such as that it may cause back problems due to wrong posture or prolonged sitting. In addition, the use of technological devices may cause electrical charges in the body due to the constant exposure to their low-level radiation. Also, technology may pose problems to children's language development if it's not used correctly. Technological devices may also cause confusion in children as they may not know how to use them, to begin with.

The researcher: Do you think technology is important in the classroom or not?

<p>P: Yes, it is important.</p> <p>The researcher: What kind of technology do you think is important to have in the classroom?</p> <p>P: Computers should be provided with suitable games and software programs (math and memory games) which help to develop the children skills.</p> <p>The researcher: Do you think technology like computers can improve children’s education?</p> <p>P: yes, it can.</p> <p>The researcher: How?</p> <p>P: I realized children improvement when I applied technology in the classroom at the first school that I worked with, they had a computer in the classroom corners when children used it, I saw that helped them a lot because they learned how to calculate by using the computer, the colors names, matching, similarity and many things.</p> <p>The researcher: What kind of things can children learn from technology?</p> <p>P: We can use devices that have interactive activities and some games which can help to improve children’s skills such as improving reading, writing and even matching and similarity. These games are very interesting and can develop their memories.</p> <p>The researcher: Do you believe that technology can improve/enhance curriculum planning or not?</p> <p>P: yes, it maybe.</p> <p>The researcher: How?</p> <p>P: In the curriculum, we have overstock of papers. So, instead of using papers, we can download them from school website daily.</p> <p>The researcher: Do mean you have a specific website for the teachers and another one for school?</p> <p>P: yes, one is the general website of the school. The second website is specifically for the teachers. The staffs from the school management supervise it, and they</p>	<p>06:22:00</p> <p>–</p> <p>10:22:00</p>
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<p>check the teachers daily planning. We do not have overstock of planning paper; we just upload it to the website directly.</p> <p>The researcher: Are parents have access to this website?</p> <p>P: Yes, they should check it every day because teachers upload the homework on the website, and the parents can discuss and post their comments.</p> <p>The researcher: Does technology make teaching easier or complex?</p> <p>P: Easier.</p> <p>The researcher: Can you please explain more how can technology makes teaching easier?</p> <p>P: Teaching becomes simple for us. Unlike in the past, it is now no longer necessary for kindergarten teachers to bring educational materials or pictures to class and to have an overstock of papers; I just show everything through the projector. Technology thus makes teaching easier for me. I think that learning will be so much easier in the future and that children will increasingly rely on technology.</p> <p>The researcher: Do you feel comfortable or nervous when you use technology in classroom? Why?</p> <p>P: I feel comfortable when I use the projector because I know that children can receive and understand the information regarding the lesson and will be able to visualise it, making it both time-efficient and effective to use.</p> <p>The researcher: How can technology be implemented in education in effective way?</p> <p>P: Children get benefit from using technology. I show them pictures or other things on the projector, which help them to understand the information that I say. Some days, I bring my iPad to let them share it with each other in order to watch something that related to our topic in the circle time.</p> <p>The researcher: Do you think teaching by using technology can promote some skills such as critical thinking, problem solving and self-learning? Or not?</p> <p>P: Yes.</p>	<p>10:22:00</p> <p>-</p> <p>27:49:00</p>
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	<p>The researcher: How?</p> <p>P: When I show the children a certain picture and each child gives his/her opinion and discuss about it that will help to improve critical thinking skill. Even I can see the individual differences between them. Self-learning also can be improved through using technology but that can only happen when the children use the devises individually.</p> <p>The researcher: Do you think that technology creates a barrier between you as a teacher and students? Or not?</p> <p>P: No. I think it creates friendly atmosphere because children love technology.</p> <p>The researcher: Does technology increase or limit classroom social interaction?</p> <p>P: I feel technology may limit social interaction at home more than at the classroom because in the classroom we use it for just 45 minutes in corners period and 30 minutes in the circle time. Children during that time are interaction with me and with each other. So, I believe technology increases social interaction in the classroom.</p> <p>The researcher: Does technology enhance or limit the relationship between the teacher and parents?</p> <p>P: It increases interaction with parents.</p> <p>The researcher: How?</p> <p>P: Through my mobile phone and by using WhatsApp, I can contact the mothers, and they can discuss their children’s needs with me. They can also access our website and see my plans and what I have done in the daily timetable; this will show them that their child is learning much. In addition, I don’t need to give a hard copy of the homework to the children because the parents can download it directly from the school website, let their children do it and then send the accomplished homework back to me. Technology, therefore, makes my job easier especially in terms of communication with the parents. Also, in my opinion, websites should be used in the classroom to let children have more freedom while learning.</p>	
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	<p>The researcher: Does technology enhance or limit the relationship between the teacher and students?</p> <p>P: It enhances the relationship due to many discussions between them and me.</p> <p>The researcher: Do you think technology like computers can create an atmosphere of collaborative work among children?</p> <p>P: Yes, so match.</p> <p>The researcher: How?</p> <p>P: When children play as a group in one computer that will let them collaborate with each other.</p> <p>The researcher: Do you think that technology helps to involve shy children or not?</p> <p>P: No, because shy children love things that isolate them from others even in the coroners' time, they enter the single corner which one child can enter this corner such as the exploring corner. I encourage them to play in the other corners, but they keep playing alone not with others. You always find the shy child in separate coroner isolated from other children. So, they love playing with the computer, it grabs their attention but will not help the shy children to involve.</p> <p>The researcher: Do you think technology has a negative or positive impact on health?</p> <p>P: Negative impact.</p> <p>The researcher: How?</p> <p>P: Frankly, technology is double-edged sword. It is bad when overused it and when you do not use it, you will be ignorant. When you overuse it, you will be isolated from society and as well as harm your eyes and your health too. There is a child who got excessive electrical charges in his brain because of using the device all the time. There must be balanced of using technology because technology devices may affect positively, I mean can help to learn and get information easier.</p> <p>The researcher: How can affect negatively on child health? can you give me more explanation?</p>	
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P: Technology may harm children hearing, vision and some children lose the ability to communicate and are isolated. Also, some children may get excessive electronic charges due to overusing iPad then cause epilepsy. Also, it may harm their body movement if they sit using it for a long time because children have brittle bones not like adults. Also, technology devices may cause autism specially when young children 2 or 3 years use them.

The researcher: Do you think that technology can affect the future of children in any way?

P: yes.

The researcher: How?

P: With the development of technology, every generation is different from the generation before. When we were in children age, we did not have the technology they are using now. We did not know technological games. The children now use the iPad, and they can hold it and use it better than me. I think children nowadays are smarter than children before because the world is open to them. Moreover, I believe that if we are not allowed children to use technology, they will be ignorant in the future because their time is different from ours and now most the society use technology. **If we use technology in the classroom now, our students will know how to use it when they're older. Who knows? They may even become experts! They can also learn better because of the widely available technological resources.**

The researcher: How can technology allow more children to participate in their suitable level?

P: In the computer, there is different games with different levels (easy - difficult levels) to consider the individual differences. So, every child starts with the easier level then continues to harder level. Then he plays the game, which is suitable for his/her level.

The researcher: What factors do you think have shaped your view of using technology with children?

P: Actually, my experiences shaped my view of using technology with children. During teaching in two different schools, I saw the difference between them. In the

first school, there was a computer available for children in the corners period, children were very active, and they were excited to learn while playing in the computer. Unfortunately, in this school, there is no computer for the children in the corners, so I realized the different between the children in the first school and this school. Also, I realized that technology developed me personally. So, I pretty sure it will develop children's skills. Also, I believe that children are smarter than me in using such technological devices and technology can achieve positive results with them.

The researcher: Do you think your beliefs have formed the way you practice teaching or not?

P: Yes, I believe that technology is important in the classroom, so I used to show children things through technology every day. It is impossible to not use technology in every single class even when I don't have something to present, I put a Holy Quran text as a picture. They can read from it and the words showed on it will be familiar for them.

The researcher: What have things in school helped to create a positive or negative attitude towards the use of technology in your schoolwork?

P: The negative attitude towards the use of technology in the school is that we have a computer lab and children go there once a week and sometimes once a month. So, they can't get enough experience. They just use it for 45 minutes and I do not feel it is enough. I think they should use it two or three times a week, because technology is very important.

The researcher: Have you studied any courses related to technology or its use, such as using computer or Microsoft?

P: Yes, at the university, I took two courses: computing and using technology in education. So unlike other teachers, I'm partly experienced in using technological devices.

The researcher: Do you have ant certificate on technology?

P: No.

The researcher: Do you think the teachers' level of formal education affects how they implement technology or not? If so, how?

P: May be. I think my technology skills improved while I was studying at the university. It increased my knowledge in many fields, such as religion and technology as applied in my field of study. At the university, using technology is not optional but compulsory, so we had no choice but to use it. I now apply technology in my classroom because I've seen its positive results when I was still at the university and because it shows positive results with my students and is easy for me to use because I've had previous experience using it. This has allowed me to make the most use of technology especially when I teach because it's the best way of presenting to the children what I'm teaching them and because it allows them to learn visually.

The researcher: Have you had an opportunity to get training on technology or not, whether self-training on the Internet or school or other?

P: No.

The researcher: Do you think you need such these courses and why?

P: I hope the Education Ministry, or the school will offer different technology-related workshops for us kindergarten teachers because it will help us know more about technology and apply it effectively in the classroom. We need to be trained to use the available facilities from the Ministry of Education, such as online homework setting and teaching parents to use these facilities.

The researcher: Does training help achieve technology integration in the classroom or not?

P: Yes, it helps a lot.

The researcher: What are the challenges you face when using technology?

P: Nothing, thanks god. I Just use simple things such as presentation, pictures so I do not face any challenges.

The researcher: What are the barriers you face when using technology in the classroom?

P: I sometimes face some barriers when I use the computer. For example, I sometimes can't play the video when I send it via e-mail. I don't know why. That's very restricting.

The researcher: Do you think there are any problems to be faced in using technology in the classroom?

P: I should use the device daily to prepare things early also for checking the attending and absent children.

The researcher: Do you think your teaching experience affects the use of technology in the classroom? Or not?

P: Yes, teaching experience affects me positively in using technology because the more I use technology and try different programs it helps me to know what the good programs is to improve children's skills. Also, the relationship between me and the children helps me to know what the good way is to teach them.

The researcher: Do you think the age of the teacher has a positive or negative impact on her attitude towards the use of technology in the classroom or not?

P: Yes, it can affect negatively. Most of the governmental schools have elder teachers who might not study at university and elder teachers cannot deal with technology. My sister is above fifty and she is a teacher at the governmental school. She cannot deal with technology even simple things although she graduated from the university. Before years ago, education faculty at the universities did not use technology, they relayed on the traditional teaching. The new generations of teachers are more likely to use technology because they have been using technology since they were young and also, they study some technology coursework at the university. Not like elder teachers who they never used technology when they were student at the university, or when they were children because technology was not exist at that time.

The researcher: What things can be provided to you to help you use technology in the classroom?

P: I hope the school allow us open everything in the computer because we are not allowed to use flash memory and not allowed to get access to YouTube; everything is blocked. Honestly, this is the main obstacle; I can just use e-mail if I want to get access to my files. So, I always send the file to my email and then open the file from the computer at the school. If I want to show children a video from YouTube, I must download the video at home then use an app to save it, after that send it to my email to be able to open it in the school which is long process. So, if the school unblock the YouTube, that will save my time. Also, I hope they provide us a computer in classroom and iPad to be available for children to use it.

The researcher: In your opinion, who can assist in supporting teacher to use technology in the classroom?

P: School administration.

The researcher: I think we have covered all the interview questions. Do you have anything you would like to add?

P: No, thanks.

The researcher: Do you have any question?

P: No, thanks.

The researcher: I really appreciate your contribution to this study and as I mentioned in the information sheet that everything will be very confidential and anonymous. I will be pleased if you agree to contact you in the future regarding any clarifications about the interview topics.

P: Yes of course, thanks

The researcher: Now I will switch off the voice recorder.

Thank you so much and have a good day.

7.3 Appendix 3.2: Information sheet for participants



Kindergarten Teachers' Beliefs about Using Technology with/by Children in Saudi Arabia

PARTICIPANT INFORMATION SHEET FOR TEACHERS

You are being invited to take part in a PhD research project. Before you decide, it is important for you to understand why the research is being done, and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please, ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

What is the project's purpose?

This project is in partial fulfilment of my doctorate studies at the University of Sheffield, United Kingdom. This study aims to explore Kindergarten teachers' beliefs about the use of technology in the classroom and the factors that can affect its integration.

The data collection will take place from 25th December 2018 to 30th March 2019.

Why have I been chosen?

I think you have some unique insight and special contribution to make to this study. You are one of the kindergarten teachers in Saudi Arabia.

Do I have to take part?

Your participation in this study is completely voluntary, so it is up to you to decide whether or not to take part. If you decide to take part, you will be given this information sheet to keep, and I will ask you, as part of the university regulations; to sign a consent form to prove that you have voluntarily consented to participate in this study. However, if at any time or for any reason you feel you want to withdraw or do not want to participate, you are free to do so. You do not have to give any reason for withdrawing.

What will happen to me if I take part?

You will be optionally requested to take part in face-to-face interviews. The interview will last between 40 to 60 minutes. The interview topics will aim to explore your points of view about the use of technology in the classroom and the factors that can affect its integration in the

kindergarten stage. There may be some follow-up questions. I may either email or call you if I need more information or clarifications for the issues raised during the interview.

What are the possible disadvantages and risks of taking part?

There are no possible dangers or risks of participating in this study. However, if any unexpected discomforts or risks arise during the research, please let me know immediately.

What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in this study, it is hoped that it may offer some exploratory insights into the use of technology and its integration in Kindergartens in Saudi Arabia. It may also guide researchers to a better understanding of the use of technology in kindergartens.

What happens if the research study stops earlier than expected?

If this is the case, the reason (s) will be explained fully.

Will my taking part in this project be kept confidential?

All the information that I collect during this research will be strictly confidential. You will not be identified in any reports or publications for any reasons. Furthermore, the data will be stored in secure places. Only individuals directly involved in the research may access the records. The findings will be presented in a way that keeps all participants anonymous. As part of the ethics guidance from the University of Sheffield, the data will be kept as long as necessary and reasonable and one year after publication, only anonymised data will be kept.

Will I be recorded, and how will the recorded media be used?

The interviews will be voice recorded. The recordings will be stored encrypted in secure places. Your name will be changed on any transcriptions.

What is the legal basis for processing my personal data?

According to data protection legislation, I am required to inform you that the legal basis I am applying in order to process your personal data is that ‘processing is necessary for the performance of a task carried out in the public interest’ (Article 6(1) (e)). Further information can be found in the University’s Privacy Notice <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>. I also need to let you know that I am applying the following condition in law: that the use of your data is ‘necessary for scientific or historical research purposes’.

Who is the data controller?

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly.

What will happen to the results of the research?

The results of this research will be used purposely for my doctoral thesis which will be available at the University of Sheffield library and as an e-thesis after completion. It may also be that some part of the thesis be published in a peer review academic or professional publication. Reports on the research may also be shared at conferences or for additional or subsequent research projects. You will not be identified in any such publication.

Who is organising and funding the research?

The research is part of my doctorate scholarship granted by The Saudi Ministry of Higher Education.

What if something goes wrong?

If any problems at all occur in relation to your participation in the project, either during the project or after it, please contact Maram Alawad (contact details are below).

If you have a complaint about the conduct of the project, then please contact Professor Jackie Marsh: j.a.marsh@sheffield.ac.uk

Who has ethically reviewed the project?

This project has been ethically approved via the University of Sheffield, School of Education's ethics review procedure.

Contact for further information.

Maram Alawad

University of Sheffield

School of Education

Email: malawad2@sheffield.ac.uk

Phone: XXXXXXXXXX

7.5 Appendix 3.4: Ethical approval from School of Education and Related Research University of Sheffield.



Downloaded: 20/12/2021
Approved: 13/12/2018

Maram Alawad
Registration number: ██████████
School of Education
Programme: (PhD) Early Childhood Education

Dear Maram

PROJECT TITLE: Kindergarten Teachers' Beliefs about Using Technology with/by Children in Saudi Arabia
APPLICATION: Reference Number 023250

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 13/12/2018 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 023250 (form submission date: 06/12/2018); (expected project end date: 31/08/2021).
- Participant information sheet 1054124 version 1 (06/12/2018).
- Participant information sheet 1052784 version 2 (06/12/2018).
- Participant consent form 1054123 version 1 (06/12/2018).
- Participant consent form 1052400 version 2 (06/12/2018).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Anna Weighall
Ethics Administrator
School of Education

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy:
<https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure>
- The project must abide by the University's Good Research & Innovation Practices Policy:
https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPpolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

7.6 Appendix 3.5: Ethical approval from Ministry of Education (MoE) Saudi Arabia.

الرقم:

التاريخ: ١٤٤١/٣/١٩

المشروعات:

المملكة العربية السعودية
وزارة التربية والتعليم
(14-)
الإدارة العامة للتربية والتعليم بمنطقة الرياض
إدارة التخطيط والتطوير
Planning & Development
إدارة التخطيط والتطوير

وزارة التربية والتعليم
Ministry of Education

" تسهيل مهمة بحث "

الاسم	مرام محمد صالح العواد		
السجل المدني	العام الدراسي	1439-1440 هـ	
الجامعة	التخصص	Early Childhood Education	University of Sheffield
الدرجة العلمية	العينة	معلمات رياض الأطفال	دكتوراه
عنوان الدراسة	معتقدات معلمات رياض الأطفال حول استخدام التكنولوجيا مع/من قبل الأطفال في المملكة العربية السعودية		
نوع الإفادة	تسهيل مهمة الباحثة في تطبيق أداة الدراسة (المقابلة) على عينة الدراسة: معلمات رياض الأطفال		

المكرمة/ قائدة الروضة.....

حفظها الله

السلام عليكم ورحمة الله وبركاته
وبعد،
بناءً على قرار سعادة مدير عام التعليم بمنطقة الرياض رقم 38920793 وتاريخ 1438/6/23 هـ بشأن تفويض الصلاحية لإدارة التخطيط والمعلومات لتسهيل مهمة الباحثين والباحثات،
وحيث تقدمت إلينا الباحثة (الموضحة بياناتها أعلاه) بطلب إجراء دراستها، ونظراً لاكمال الأوراق المطلوبة نامل تسهيل مهمتها مع ملاحظة أن الباحثة تتحمل كامل المسؤولية المتعلقة بمختلف جوانب البحث، ولا يعني سماح الإدارة العامة للتعليم، موافقتها بالضرورة على مشكلة البحث أو على الطرق والأساليب المستخدمة في دراستها ومعالجتها.

شاكرين لكم حسن تعاونكم

مدير إدارة التخطيط والمعلومات
المساعدة/ بديعة الجبري
سعود بن راشد آل عبد اللطيف ١٤٤١ هـ

وزارة التعليم
إدارة التخطيط والمعلومات
إدارة التخطيط والتطوير

من / قسم الدراسات والبحوث
إ. العمري

6٥

رمز العلوية ت ط ٤٦

الإصدار: 1.0

تاريخ الإصدار: 1436/8/5 هـ

صفحة 10 من 18

7.7 Appendix 3.6: Timetable for the study

Time Tasks	Literature review	Development of the protocols	Methodology plan	Ethical approval	Data collection	Data analysis	Writing up
October 2017	<ul style="list-style-type: none"> Attended mandatory courses Communication skills Supervision meetings 	Development of a qualitative protocol					
November							
December							
January 2018							
February	Writing confirmation and report submission		Development of methodology Plan				
March							
April							
May							
June	Confirmation approved						
July							
August							
September							
October	Amending the qualitative protocol based on the feedback of reviewers		Amending the methodology plan	Applying for ethical approval in the UK and Saudi Arabia.			
November							
December							
January 2019							
February					Conducting fieldwork to collect data		
March							
April							
May							
June	Finalising of qualitative protocol	Finalising of methodology plan					
July	Preparing for main study						
August							
September							
October						Working on transcribing, translating, and analysing data of the main study	
November							
December							
January 2020							
February							
March							
April							
May							
June							
July							
August							
September							
October							Writing up on the thesis
November							
December							
January 2021							
February							
March							
April							
May							
June							
July							
August							
September							
October							Submission of the thesis
November							
December							
January 2021							
February							
March							
April							
May							
June							
July							
August							
September							
October							Viva Exam
November							
December							
January 2021							

7.8 Appendix 3.7: Appendix: Summary for Participants

Appendix: Summary for Participants

The present study investigated Saudi kindergarten teachers' beliefs about the facilitators and barriers to using technology in teaching children. The following findings can help you understand the benefits and challenges of using technology in teaching and encourage you to use it effectively to enhance learning outcomes.

1. Being confident in using technology can facilitate its integration into teaching practice. Hence, it is essential to build your confidence and competence in using technology.
2. Choosing technology and apps that support children's learning can help enhance their learning outcomes. Therefore, it is necessary to choose technology that is developmentally appropriate and relevant to your curriculum.
3. Early exposure to technology can improve children's technological skills and learning outcomes. Hence, integrating technology into your teaching practice can benefit children's overall development.
4. Technology can be a barrier to education, as it may offer distractions for both children and teachers. Therefore, it is essential to use technology appropriately and minimize distractions during teaching.
5. Involving parents in their children's learning by providing additional support at home and attending teacher sessions can enhance children's learning outcomes.
6. Technology is widely available and accessible in most Saudi households, making it a useful tool for planning lessons and being time efficient.
7. Further education is crucial for teachers to improve their practice of using technology in the classroom.

In conclusion, utilising technology in teaching can benefit children's overall development. It is essential to choose appropriate technology and apps, build your confidence and competence in using it, minimize distractions, involve parents, and pursue further education. I hope that this summary helps you understand and learn from the study's findings to improve your practice of using technology in the classroom.