**Title**

# The adoption of digital technologies by public high school educators in Gauteng

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**Abstract**

The prevalence of technology in society is increasing and transforming every aspect of modern-day civilization. Technology has transformed industries and will continue making inroads in every industry that technology can disrupt. In education technology has shown its effect by reforming learning and the teaching processes. Technology is argued to inspire inclusion, reinforce subject learning, boost collaboration, and play a part in increased innovation in both educators and learners. However, technology comes with a lot of challenges that create gaps in access. These gaps are concerned with the discrepancy of technology access and usage, whereby those in underprivileged environments cannot fully access technology due to the absence of infrastructure and resources. Therefore, to ensure the gap between those who have access and those who do not is decreasing, strategies and policies must be put in place to address such inequality.

Although technology use in education is increasing, what contributes to this adoption of technology by educators in the classroom has not been extensively explored in South Africa. This quantitative study aimed to investigate the factors influencing public school educators' adoption of digital technologies in the classroom, focusing on high school educators in Gauteng, South Africa. The Unified Theory of Acceptance and Use of Technology adoption model was utilised as the framework to observe factors influencing public school educators' adoption of digital technologies in the classroom. This study focused on a model that examines the factors influencing individuals' intention to use technology and their actual usage behaviour. The model identified three main factors that directly influence intention: social influence, effort expectancy, and performance expectancy. Additionally, it highlighted two direct factors that impact usage behaviour: facilitating conditions and intention.

The associations between these factors and intention and usage behaviour are further influenced by mediating factors such as experience, voluntariness, age, and gender, as suggested by Venkatesh et al. (2003). These mediating factors play a role in shaping the relationship between the main factors and individuals ‘intentions and behaviour regarding technology usage.

Data was collected using an online survey and the survey was sent to Gauteng educators and 104 educators responded. Both descriptive statistics and inferential statistics were used to analyse the data. Females were at 52.9% and males were at 47.1%. The location of schools where educators were based was 34.6% based in urban areas and 65.4% in townships. Most of the respondents were in the age category of 26-35 years (46.2%), the following category 46-55 years (21.2%), followed by 36-45 years (16.3%), under 25 years (10.6%) and lastly 56 and older years (5.8%). The results from this research study indicated that younger educators tend to utilise more ICT in the classroom when compared to older educators. Furthermore, the results showed that as the educator's age increases, their frequency of using ICT decreases. Therefore, government representatives, technology leaders in education and school management should propose comprehensive ICT development courses that will equip educators of all kinds with the necessary technology skills to assist them in implementing these technologies in the classroom.

**KEYWORDS**
ICT Access, ICT Usage, ICT Competence, ICT Skills, Digital Technologies, ICT adoption.

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# LIST OF ACRONYMS

**ICT**: Information and Communication Technology

**4IR**: Fourth Industrial Revolution

# CHAPTER 1. INTRODUCTION

## 1.1 Purpose of the study

This quantitative study aimed to investigate the factors influencing public school educators' adoption of digital technologies in the classroom, focusing on high school educators in Gauteng, South Africa.

## 1.2 Background of the study

South Africa is considered one of the most unequal societies globally, and this social problem of inequality is multifaceted (Gudmundsdottir, 2010). The recent poverty and inequality report by the World Bank states that inequality can be defined as lack of access to resources, income gap, appropriate healthcare, high rates of unemployment and low educational attainment (Triegaart, 2009). Contributing to South Africa being an unequal country include lack of access to resources, unequal access to technology, high rates of unemployment and a poor education system (Gudmundsdottir, 2010).

Lack of access to resources persists in South Africa where the distribution and allocation of wealth, facilities, amenities, and services has remained dominantly unequal for decades (Gudmundsdottir, 2010). This is evident in the resource allocation between urban and rural areas whereby urban areas have more access to services and facilities. Many rural and township areas in South Africa survive beneath subsistence levels and continually stay in those impoverished conditions for the reason of having little to no access to fundamental infrastructure that is essential in improving the quality of life (Herselman,2003). Consequently, millions of people in rural and township areas do not have access to facilities such as electricity, internet and digital technologies which further increases the inequality gap (Herselman,2003). This geographic disparity leaves many without access to important pillars of economic growth. The geographic location places immense restrictions on accessibility to information, economic inclusion, knowledge, and utility of the internet, which is a vital component in encouraging economic vitality, learning, and business development (Costello. 2000).

Additionally, to South Africa being an unequal society, and the country has a rising high rate of unemployment. South Africa's rising unemployment rate poses a major threat to the country's stability and growth (Leward & Lazarus, 2021). Unemployment is not only damaging to the country's economic outlook, but it also has dire social costs and implications. Individuals who are out of jobs are vulnerable to many social challenges such as increased mental health issues, reduced to no income, health problems and negative family effects (Leward & Lazarus, 2021). Furthermore, Leward and Lazarus (20stateates that those who have been without a job for a long time are more likely to find it difficult in securing future employment (Leward & Lazarus, 2021). Therefore, as unemployment increases in a country, the levels of social issues and inequality also increase (Leward & Lazarus, 2021). The labour force is currently growing by around 101,000 people per quarter in South Africa, whereas the economy is creating on average 53,000 jobs per quarter (Statistics South Africa, 2022). This is an indication that there is a big gap in meeting the demand of finding people employment.

The education system in South Africa is no exception in creating inequality, with poor educational outcomes over the years, debilitated infrastructure, overcrowded classrooms, and a lack of school resources (Gudmundsdottir, 2010). The South African education system is classified into two layers: the first one constitutes those who come from wealthy backgrounds and attend schools that provide high-quality education, and the second tier is made up of many learners who come from poor backgrounds and attend public schools offering low-quality education lacking access to resources and facilities (Jaarsveld & van der Walt, 2018). This disparity in education access and resources further exacerbates the inequality gap in South Africa. Schools in the rural/township areas lack access to electricity, no phone-lines, lack of books, textbooks, writing materials, learners walk kilometres to access these schools and technology used in these schools is at a latent stage. Therefore, to bridge the gap between the two-tier education system and fight inequality in South Africa, more resources need to be allocated to schools based in rural and township areas.

Furthermore, as the education system in South Africa continues to be portrayed by poor performance, inequalities, and poor infrastructure (McKeever,2017).

Recently, this inequality has been exacerbated and compounded by the introduction of technology in the classroom (Jaarsveld & van der Walt, 2018). Technology is fast becoming part of the teaching space and the modern group of learners are using these technologies every day (Jaarsveld & van der Walt, 2018). The utilisation of Information Communication Technologies (ICT) in the classroom has increased and will continue to increase due to the prevalence of technology in society (Ghavifekr, Kunjappan, Ramasamy, & Anthony, 2016).

The advent of the Fourth Industrial Revolution (4IR) has added a further tier of inequality in South Africa whereby those with access to the technologies are developing and advancing (Jaarsveld & van der Walt, 2018). In 2020, the globe was disrupted by the Covid-19 virus and many countries including South Africa implemented national lockdowns in efforts to stop the spread of the virus. The lockdowns implemented during this time obstructed traditional schooling (Schleicher, 2020). This resulted in school closures and the adoption and use of technology in efforts to keep learning ongoing. During this time learners and educators had to depend on their own devices to keep learning going using various platforms such as email, internet, radio, television, online videos, and social media (Schleicher, 2020). Educators had to quickly learn how to use these technologies to facilitate learning and many were not fully equipped to do this. In addition, schools, and learners from less resourced areas, who did not have access to these digital technologies were at the risk of falling behind from the yearly curriculum (Schleicher, 2020).

The effort of adopting digital technologies to maintain the academic programme did not yield positive results especially for learners and educators in poor communities (Dwolatzky & Haarries, 2020). Learners in poor schools and communities did not have access to digital technologies and educators did not possess the necessary skills to assist learners with these technologies (Dwolatzky & Haarries, 2020). This left many educators unable to complete the curriculum and learners not being able to access educational content (Dwolatzky & Haarries, 2020). This gap in learning and teaching disrupted the curriculum. Van der Berg (2020) claims that such gaps in children's education may have a lasting impact which will make it difficult for learners in those environments to ever catch up to their counterparts. The Covid 19 pandemic beamed a spotlight on the

inequality of connectivity and access to ICT. Indicating that this disparity will exacerbate the inequality that already exists in the education system in South Africa whereby learners in underprivileged environments cannot compete with the well-resourced learners due to lack of access to resources and infrastructure (Dwolatzky & Haarries, 2020).

This inequality in connectivity and access to ICT is frequently associated with the notion of the digital divide (Gudmundsdottir, 2010). The digital divide terminology is explained and used in various contexts and settings by different authors, but in this report, the concept is presented as the discrepancy of ICT access and usage (Gudmundsdottir, 2010). The digital divide issue is increasing, turning into a key concern for government and policy makers (Dornisch, 2013). The rising concern of the digital divide in the education sector is because technology integration into society is growing at a rapid rate but not every school, educator, and learner has equal access to these technologies (Dornisch, 2013).

In summary, the social issues listed above all contribute to South African being one of the most unequal countries. The advent of technology use is creating an added layer to South Africa's social problems. The use and integration of technology in modern-day society is growing faster, and with it comes a lot of challenges (Dornisch, 2013). Therefore, to ensure that the gap between those who have access and those who do not is decreasing, strategies and policies must be put in place to address this inequality. Furthermore, it is important for the education sector to be able to keep up with the trends of technology in learning and ensuring that no learner and educator is left behind and lacks access to these technologies (Jaarsveld & van der Walt, 2018).

## 1.3 Research problem

ICT is a facility that allows individuals and businesses to interconnect in the digital world (Lei & Zhao, 2007). ICT can be presented in different technology forms such as video equipment, web-based information, emails, multimedia, images, video, sound, and personal computers. ICT technologies are increasing in their prevalence in society and have transformed many industries. In education, these technologies are considered as stimulants for new methods of teaching and learning (Lei & Zhao, 2007). Buabeng (2012) argues that greater adoption and utilization of ICT in education will encourage inclusion, strengthen subject learning, encourage collaboration, and increase innovation in both learners and educators.

As mentioned above, ICT can transform the education sector however that ability to transform teaching and learning may not be realized when some educators do not have access to ICT, are not well equipped to use it and there is no support and infrastructure provided (Lei & Zhao, 2007). Educators are crucial and central in ICT integration and adoption in the classroom (Raman & Yamat, 2014). The educator's access, skills, motivation, attitude, computer self-efficacy, and cognitive ability influence the adoption of ICT technology in the classroom (Raman & Yamat, 2014). These factors are considered predictors of digital technologies in a learning setting (Raman & Yamat, 2014). Therefore, understanding these factors will aid in creating interventions to assist educators in effectively adopting ICT into the classroom (Raman & Yamat, 2014).

Buabeng (2012) argues that educational institutions need to restructure their classrooms, curriculum, retrain educators and provide facilities to support ICT usage in the classroom. The author further stated that reskilling and supporting educators are crucial components in ensuring that there is effective adoption and utility of ICT in the education sector (Buabeng, 2012). As mentioned above educators play a central role in ICT integration in education and failure to prioritize educator's support and training will result in the adoption of ICT in education remaining limited (Buabeng, 2012). Furthermore, restructuring in education is important as it allows for the shift from existing teaching practices to new ones that will encourage meaningful learning and teaching using ICT (Buabeng, 2012).

Restructuring and introducing ICT in the classroom requires an injection of resources and infrastructure. This needs to address the barriers to the adoption of ICT in the classroom and these barriers include unavailability of equipment, limited internet coverage, outdated computers, and unskilled educators (Keebine, 2007).

Additionally, the current literature places a lot of emphasis on learners and increasing accessibility of ICT, this narrative of focusing on increasing accessibility in learners only, neglects to look at educators as they are the implementors of these technologies in the classroom (Pelgrum, 2001; Al-Oteawi, 2002). Without providing infrastructure and sufficiently training educators to utilize ICT in the classroom, it becomes impractical to effectively integrate technology in the classroom (Dlamini & Mbatha, 2018).

Educators must acquire ICT skills to stay in touch with today's technological revolution (Keebine, 2007). Thus, it is important in this study to ascertain factors that affect the adoption of digital technologies by public high school educators. The imperativeness of this study is rooted in the belief that successful delivery of digital technologies in the school room relies upon ICT-competent educators and once educators are confident in ICT skills, this will result in the advancement of the learning and teaching process.

## 1.4 Research objectives

This research investigated the factors contributing to educators' adoption of digital technologies in the classroom, focusing on public high school educators in Gauteng, South Africa. As a result, the following objectives were investigated:

**Objectives:**

1. To investigate factors contributing to educators’ willingness to adopt digital technologies in the classroom.

2. To investigate factors that inhibit educators from adopting digital technologies in the classroom.

3. To determine whether ICT competence affects how educators implement digital technologies in the classroom.

4. To investigate the level of ICT usage in educators.

## 1.5 Significance of the study

In South Africa, the availability of computing devices is growing faster than educator training offerings in digital technologies (Mlambo, Rambe & Schlebusch, 2020). This indicates that ICT adoption and integration in education requires a serious commitment by the government and related stakeholders to develop ICT-friendly policies and provide sufficient training and support for educators to effectively adopt and integrate ICT (Mlambo et al., 2020). This research study aims to provide insights into how policymakers could respond to the digital transformation in education.

This research study establishes two contributions. The first input contributes to the theoretical framework by integrating external variables such as age and technical support into the Unified Theory of Acceptance and Use of Technology model (UTAUT) basis for investigating behavioural intention of using technology. The intention is to make practical input. The research study outcomes can provide practical insights into the education sector by providing a clear view of factors contributing to educators' adoption of digital technologies in the classroom. Therefore, it is important to conduct research of this nature to add to the understanding of educators' digital technology adoption to ensure appropriate interventions are taken. Further, an understanding of educator digital technology adoption factors will help implementors of ICT policies in schools.

Second, this study brings a contextual contribution by investigating factors influencing high school educators' adoption of digital technologies in the classroom, focusing on high school educators in the South African environment. In South Africa, there is not enough academic literature on educators' adoption of digital technologies in the classroom. Research into this topic has been covered extensively in other countries but not in South Africa. Further, in terms of contexts, the current research on the adoption of ICT in education focuses primarily on learners, and insufficient emphasis is placed on educators (Mlambo et al., 2020). This narrative of focusing on increasing accessibility for learners only neglects to look at educators as implementors of ICT in the classroom (Buabeng, 2012). For that reason, this research study focuses on educators.

## 1.6 Delimitations of the Study

This research study investigates the factors influencing educators' adoption of digital technologies. Below are some of the delimitations of this research study:

- Research was limited to only high school educators in Gauteng province in South Africa.

- The study focused on educators' adoption of digital technologies in the classroom instead of educators' pedagogical knowledge in teaching and how that can influence how they use digital technologies.

- The research focused on educators as the implementors of the digital technologies in class, neglecting other role players such as school leaders (principals and heads of departments).

## 1.7 Definition of Terms

In this report, the concepts of ICT and digital technologies are used interchangeably. These two concepts are usually used synonymously in Information Technology related research.

**Digital Technologies** refer to devices, systems, and tools used to process and store information (Raman & Yamat, 2014).

**ICT** is information and communication technology which is simply a facility that allows individuals and businesses to interconnect in the digital world (Buabeng, 2012).

**ICT Access** refers to an individual's ability to access ICT through the internet, communication mediums, cell phones, and wireless networks (Buabeng, 2012).

**ICT Usage** refers to an individual's ability to use the ICT and this is characterized by the duration, frequency, device used, and connectivity (Buabeng, 2012).

**ICT Competence** cites the degree of understanding an educator possesses in utilising digital applications. These are motivation, attitudes, ICT skills, and computer self-efficacy (Lei & Zhao, 2007).

**ICT Skills** refer to skills needed to utilize and implement a particular digital application (Lei & Zhao, 2007).

**ICT adoption** refers to the acceptance, use and integration of technology in the classroom (Lei & Zhao, 2007).

**The Digital Divide** is repeatedly described as inequality in accessing digital technologies; the digital divide's essence lies in the discrepancy and inconsistency of information and communication technologies access and usage (Gudmundsdottir, 2010).

## 1.8 Assumptions

The following depicts assumptions made in this research study:

- The research study respondents answered the questions honestly.
- All respondents had internet access to answer the research study survey questions.
- All respondents proficiently understood the concepts described in the study.
- The researcher assumed that respondents would reflect standard perspectives and experiences.
- The assumption is that understanding educator digital technology adoption factors will help implementors of ICT policies in schools.

## 1.9 Chapter Outline

In this chapter, the researcher specified the purpose, background, rationale, problem, objectives, significance, definition of terms, limitations, and assumptions of this research study. This research investigated the factors contributing to educators' adoption of digital technologies in the classroom of high school educators in Gauteng, South Africa. The main objectives were to investigate educators' willingness to adopt digital technologies in the classroom. Investigate the inhibitors that detract educators from adopting digital technologies in the classroom and determine whether ICT competence affects digital technologies in the classroom.

Chapter 2 followed this chapter, whereby the researcher conducted a literature review on factors contributing to educators' adoption of digital technologies in the classroom. The chapter depicted the theoretical framework that this research is based on. In Chapter 3, the methodology section was discussed in detail and presented the research design, research approach, population, data collection

methods, procedure for data collection, sample, research instrument, data analysis, validity, reliability, demographics, ethical considerations, and limitations of the study. Chapter 4 focused on presenting the results, analysis of the quantitative data and the interpretation of the analysis. Chapter 5 reviewed and verified findings through a discussion of the main findings from the research and connected those findings to the literature and the outcomes of the research. Chapter 6 presented the overall summary of the findings, limitations of this research, suggestions for future research, conclusions, and recommendations.

# CHAPTER 2. LITERATURE REVIEW

## 2.1 Introduction

This chapter reviewed the literature on the factors influencing educators' adoption of digital technologies in the classroom. The chapter began by giving a brief overview of challenges in the education system in South Africa, how ICT adoption in the education sector is rapidly growing worldwide and how governments all over the globe are prioritizing this integration of technology into the schooling system. The review further looked at the importance of ICT integration into the schooling system and its importance. In addition, educator ICT competence is discussed extensively as factors potentially impacting this competence. Furthermore, the review touched on the digital divide concept and how it applies to educators. The review was guided by the research objectives and followed that structure. Finally, the theoretical framework for the research study was described.

## 2.2 Challenges in the education system in South Africa

South Africa is a multicultural country with an estimated 60 million citizens. Before 1994, the country was under an apartheid system where racial segregation existed. This ideology by the apartheid government created inferior educational opportunities for non-White citizens. Post-1994, when the apartheid regime was abolished, a new government took over and revised many policies and structures that the apartheid government erected. Education was part of this revival and has gone through massive transformation. However, the education system in South Africa lingers in a position of transformation as the struggle with the legacy of apartheid continues (Zewotir & North, 2011). In their research study, Grant, Jasson and Lawrence (2010) showed that schools in South Africa have inherited the disfunction left by the apartheid government. This dysfunction includes overcrowded classrooms, lack of access to quality education, inadequate educator training, and dysfunctional infrastructure (Dwolatzky & Haarries, 2020). In this regard, long history of dilapidation, of instilling inferiority, discrimination and inequality continues to exist today in the South African education system (Dwolatzky & Haarries, 2020). These inequalities mentioned

above are mostly experienced by schools in the rural and township areas in South Africa (Dwolatzky & Haarries, 2020).

Therefore, when analysing the adoption of digital technologies by educators in schools, the analysis cannot occur without looking at the current state of the education system in South Africa. And to understand the extent of these problems in the school system, it is necessary to list them as follows:

### 2.2.1 Learner challenges

In South Africa, the dropout rate is high, with two out of ten learners dropping out as early as Grade three (Pather, 2011). This indicates that of those who start Grade one, only a quarter finish Grade 12. “It is interesting to note that of the 7 000 secondary schools in the country, 10% (independent and Model C schools included) produce 60% of all students who can attend university. Another 10% from historically disadvantaged schools produce a further 20% of such students whereas the rest of the schools produce the other 20% qualifying for university entrance’ (Pather, 2011, p.14). Some of the leading contributors to South Africa’s high dropout rate are teenage pregnancies, with 106 383 babies delivered by teenage mothers (ages 10-19) in 2019 (Statistics South Africa, 2020). Community violence also plays a role in the high dropout rate, whereby schools in violent communities have to close down due to fights and shootings, interrupting the schooling calendar. The average repetition rate in South Africa is currently at 7%, and this repetition rate leads to some learners becoming demotivated and ultimately quitting school (Statistics South Africa, 2020). Lastly, the abuse of substances and alcohol by school learners is on the rise in South Africa and it is estimated that alcohol consumption among school learners is twice the world norm (Statistics South Africa, 2020).

### 2.2.2 Educator challenges

Overcrowded classrooms distinguish the dysfunctional education system in South Africa, educators are faced with the challenge of too many learners in the classroom, resulting in the struggle to teach effectively, difficulty maintaining discipline as well as a lack of sufficient resources for every learner in the

classroom (Dornisch, 2013). Further to the overcrowded classroom is that educators do not receive the necessary professional development to deal with overcrowded classrooms, keep up with technological trends and stay up to date with new pedagogical approaches (Yildirim, 2007). Educator training is challenging due to a lack of supportive leadership, a restrictive education system, corruption, and unconducive working environments (Yildirim, 2007).

Another challenge educators face is the fear of uncertainty about the future of education in South Africa. Matoti (2010), found that many educators were in doubt about the prospect of teaching in South Africa. These fears included low morale due to low pay, bad working conditions, lack of infrastructure (computers, whiteboards, books), policy changes, frequent curriculum changes, high rates of educator attrition and political instability. These factors affect educators' abilities to effectively facilitate teaching and learning.

### 2.2.3 Poor infrastructure

Apart from the challenges facing educators and learners, penurious and substandard infrastructure continues to be a great stumbling block in education (Howie, Muller & Paterson, 2005). The lack of infrastructure in South African schools compared to developed countries is staggering. For instance, in the USA, over 90% of high school educators in public schools have access to a whiteboard, projector, computer or access to the internet somewhere on the school premises (Role & Role, 2013). In South Africa, such technology integration in the classroom is still a pipeline dream. Nonetheless, the South African government has embarked on a journey to increase the accessibility of computers in schools. An Educator Laptop Initiative (TLI) was conceptualized as a plan of action to ensure that the 350 000 government school educators have access to a laptop, can use it and can access the internet through providing a monthly stipend for the educators to purchase the costs of connecting to the internet (ELRC Annual Report, 2011).

However, this initiative was short-lived due to funding challenges, corruption, educators not receiving training on how to use these computers and no availability of the promised stipend for the internet (ELRC Annual Report, 2011). Therefore,

the objective of providing this infrastructure to educators was not realized. Moreover, even with the provision of laptops and internet, there was no guarantee that educators would be able to fully utilize the technology due to the lack of electricity in some rural schools, no ICT towers to support the connectivity and no skills on how to use the technology (Farrell & Isaacs, 2009).

Therefore, it is important to address challenges faced by the education system in South Africa because failure to do so will create barriers to meaningful integration of ICT into the classroom. Moreover, as mentioned above, the school system in South Africa is flawed and unequal, resembled with poor performance and a lack of resources. More work needs to be done to address these challenges faced by the education system in South Africa.

## 2.3 Impact of ICT on facilitating teaching and learning

There is currently no consensus in the literature on the impact of teaching and learning utilizing technology. Other scholars such as Newton and Rogers (2001), assert that even though ICT has been used in the classroom for quite some time, there is still some unpredictability over the technology merits or demerits. The authors further assert that technology is not all good, learners can be confused by the vast information available to them, the increased availability of unverified information and websites containing uninvited content that might cause harm (Newton & Rogers, 2001). Mikre (2011) further argues that technology being used in the classroom might put schools, learners, and educators at risk of security breaches, misuse of technology by both educators and learners and might cause major distraction as learners can with ease switch between websites and other platforms at the expense of the learning time.

However, researchers have also reported the benefits of using ICT in the classroom. Newman (2002) argues for ICT use in the classroom, and the benefits mentioned increase content interest among learners, improved ways of teaching and learning, shared learning resources, and promotion of collaborative learning amongst learners. Furthermore, ICT can facilitate autonomous learning and assist learners in taking charge of their own learning process through

manipulating, modifying, and retrieving information (Wheeler, 2000).

Finally, as much as there is an ongoing debate on the impact of ICT in education, there is no doubt that good and careful deployment of it can have useful outcomes. According to Beyers (2010), ICT is a tool that can be used to bridge a gap between the rich and poor schools in South Africa. It is a tool that can be used to improve the quality of education and improve human resource development (Beyers, 2010).

## 2.4 Meaningful Integration of ICT in Education

The use of ICT in education is rapidly increasing worldwide, with governments significantly increasing their ICT investments to transform and improve methods of learning and teaching in education (Buabeng, 2012). Different governments have instituted these initiatives to transform education across the globe. South Africa, as a country, is not excepted from such growing trends. While South Africa is characterized as one of the emerging and highly ranked economies in Africa, it faces an enormous challenge regarding ICT infrastructure and providing access, especially in the education sector. ICT infrastructure provision is low, which adds to the dysfunctional education system, stark by inequalities and underperformance (Dwolatzky & Haarries, 2020).

As mentioned above, technology use in society is increasing and has become ubiquitous; it affects every aspect of life, at an individual, community, and household level. Yet, many schools are still far behind in meaningfully integrating technology in the classroom (Rathore & Sonawat, 2015). Integrating technology in the classrooms must occur across the curriculum and improve the teaching and learning process. According to Rathore and Sonawat (2015), meaningfully integrating technology in the classroom means using technology to support and improve four key sections: active engagement, educators' access to ICT professional development, enhanced learning, and improved learner achievement. Literature on ICT integration in schools suggests that most schools in developing countries are only starting to investigate the prospects that technology could offer in improving the teaching and learning process (Christensen, 2008). Therefore, there needs to be strong efforts made to fully

integrate ICT into the classroom to ensure that the education sector does not fall behind.

There is an increasing consensus among education reformers that preparing learners for future jobs requires schools to keep up with technological advances (Christensen, 2008). The consensus states that correctly utilized technology will assist learners in schools in acquiring skills that will help them survive the technologically advanced economy. This process can only happen if schools introduce ICT into the teaching and learning process. One of the vital aspects in technology integration in the classroom is that educators need to be competent and confident in using technology to deliver the curriculum. Evidence shows a divide between learners and educators regarding confidence levels in using technology for learning purposes (Dornisch, 2013). Learners have more interest and desire to use and engage with technology than educators (Dornisch, 2013). Educators cite diverse influences of their reluctance to employ technology in the classroom. These include a lack of skills, not finding value in utilising technology, lack of motivation, and lack of support and confidence. Therefore, for technology integration to be successful in schools, there needs to be concerted efforts in upskilling educators to be ICT competent to support technology integration in the classroom.

Charania (2011) stated that the only way to understand ICT integration in the classroom is for it to be seamless. Seamless integration occurs when the learners and educators use technology daily in their classroom activities and can access different tools that allow for a deeper comprehension of the content (Charania, 2011). The variety of tools available could include digital technologies such as interactive whiteboards, computers, multi-touch screens, tablets, projectors, and others. The concept of seamless integration does not stop there; it further acknowledges that tools alone will not result in successful integration. Tools need to go hand in hand with other factors, such as a reviewed pedagogy that allows for technological integration, willingness from educators to embrace technology and new ways of designing learning activities (Christensen, 2008). Technology integration needs to align with the curriculum and instructional plans. As a result, technology can be viewed as an aid to what already exists instead of being seen as an additional layer in the classroom (Christensen, 2008). According to Flewitt

(2011), seeing technology as an aid in the classroom allows educators to effectively design activities using technology and for learners to utilize technology in forming their learning. Additionally, this perspective observes technology in the classroom as an aid compared to being an end itself, educators become facilitators, and learners use technology to engage deeper with content (Charania, 2011).

In essence, successful intergeneration of technology in the classroom can be achieved when the above factors have been met. Technology must become an integral piece of how the modern classroom functions and must be accessible to all educators and learners. Education reformers believe that when technology integration is successful, it can provide new powerful ways of teaching and learning. It can provide educators and learners with access to vast information, new ways of recording information and engaging with experts worldwide (Flewitt, 2011).

Finally, to ascertain the success of technology integration in the classroom, the following elements must be achieved (Zhao & Frank, 2003):

- The learning process should be focused on equipping learners with competencies.
- Infrastructure should allow for the integration of ICT in the classroom.
- The use of technology must enhance and improve the teaching and learning process.
- Technology must be suited to assist with the development of learners.

## 2.5 Factors that contribute to educator ICT adoption in the classroom

In preparation for unpacking literature on factors impacting the adoption of ICT by educators, it is important first to understand the concept of adoption in technology terms. Adoption can be described as decisions people make every time, they consider using an innovation (Rangaswamy & Gupta, 2000). Likewise,

in Rogers's Diffusion of Innovation Theory (2003), adoption is described as a decision made by an individual to choose to utilize innovation. Rogers (2003) further asserts that the adoption process has different phases whereby individuals start by hearing about the innovation to adopt the innovation finally. Earle (2002) expressed ICT adoption as a concept of wholeness whereby all system components are interlinked and reflect as a whole. For instance, in educators' adoption of technology, all elements (access, educator competence, ease of use, and management support) are important components.

Different researchers have recognized several factors affecting the adoption of ICT in teaching. Buabeng (2012) recognized organizational capacity, user traits, and personal characteristics as factors influencing ICT adoption and integration into teaching. Other authors identified factors such as institutional support, educator capability, frequent use of the internet, and attitudes towards technology as some of the contributing factors (Chen, 2008). Moreover, educator training, educator confidence in using ICT, competence, a supportive environment, embracing change and a positive attitude are all linked to educators' integrating ICT into the classroom (Korte & Husing, 2007).

### 2.5.1 Personal Characteristics of the Educator

According to Schiller (2003, as cited in Buabeng, 2012), personal attributes such as age, number of years of teaching, experience using a computer, and educational level can impact technology adoption in the classroom. Buabeng (2012) conducted a study where a survey was distributed to educators to find the influencing factors in adopting and integrating ICT in the classroom.

An educator's attributes play a role and have significant influence. Educators who have been observed to lack skills, knowledge and experience were found to be reluctant about incorporating ICT into their classrooms and teaching practices (Habibu, 2012). Thus, these characteristics would pose a barrier to educator acceptance and integration of ICT. Another study found that educators not confident in using ICT will not encourage and support other educators to adopt ICT into their classrooms (Guma, Faruque & Khushi, 2013).

Therefore, understanding personal characteristics that influence educators' adoption and integration of ICT into teaching is relevant. The educator's attitude towards technology was the main factor underpinning the personal attributes (Buabeng, 2012). This meant that educators had to have a positive attitude towards technology.

### 2.5.2 Educator Attitude toward Technology

Educators are the implementors of technology in the classroom, and to successfully institute and execute ICT technologies, educator's attitudes towards technology are vital. This notion is supported by Demirci (2009) research conducted on educators' attitudes, in Turkey, in integrating Geographic Information System (GIS) technology into the curriculum. Demirci (2009) showed that while barriers such as lack of internet access and hardware infrastructure existed, educators' attitudes towards implementing GIS into the geography curriculum were vital to a successful integration (Demirci, 2009).

This supports the statement by Keengwe and Onchwari (2008) that when educators discern technology as not adding value and fulfilling their classroom and learners' needs, it is most plausible that they will not accept the technology. As a result, educators' attitudes and beliefs toward technology are important and need to be considered a contributing factor toward educator adoption of technology in the classroom.

In fact, the educators 'attitude towards ICT predicts the prospect of adoption (Asuman, Khan & Clement, 2018). The integration of ICT in the classroom relies on whether educators feel positive and believe that technology will assist them to teach and deliver classroom content effectively. Watson (2003) argues ICT adoption in the classroom by educators requires a change of mind and attitude toward technology. According to him when planning to implement ICT in school, it is important to consider educator attitudes to embracing change because that will determine whether there is an effective adoption of ICT. Asuman et al., (2018), claimed that there is a link between educators' attitude towards ICT and their understanding of whether it will benefit their classrooms and learners.

Therefore, educators' attitudes towards ICT adoption are important and should be thought out when planning to implement technology in schools.

### 2.5.3 Computer Self Efficacy

According to the Social Cognitive Theory by Bandura (1997, as cited in Baubeng, 2012), self-efficacy can be described as one believing in their capabilities to act necessary to attain a certain goal. In actual implication, self- efficacy can be referred to as confidence in one's ability to do certain tasks successfully. In this context, computer self-efficacy is the educator's belief in effectively integrating ICT technology in the classroom. Several research studies have mentioned self-efficacy to have an effect and influence on the educator's utilization of ICT. Yuen and Ma (2008) research study on Hong Kong educators revealed that ICT integration was determined by perceived educator belief and their experience in using computers. Therefore, educator computer self-efficacy is an important factor to study as it influences educator judgment on their abilities to use ICT.

There is also a significant correlation between educators' use of technology in the classroom and their self-efficacy (Li, Worch, Zhou & Aguiton, 2015). According to Li et al., (2015) there is a positive correlation between the educator's use of ICT in the classroom and their self-efficacy. Their study determined that the educator's self-efficacy influences student achievement and teaching practices (Li et al., 2015). Another worth noting is that educators with a high sense of self-efficacy build learning spaces where learners can experiment and take ownership of their learning process (Swan, Wolf, & Cano. 2011). Therefore, self-efficacy is vital and a key ingredient in implementing ICT in the classroom by educators.

### 2.5.4 Professional development

Educator training and development are key to successfully integrating technology in the classroom. ICT-related development training programmes impact educator acceptance and ICT adoption (Yuen & Ma, 2008). These programs advance educators' competence in using ICT (Buabeng, 2012). In addition, when educators are well-trained in ICT integration, they become more confident and maintain positive attitudes towards ICT (Yuen & Ma, 2008). Educator training on

ICT increases their confidence and gives them tools to understand the significance of using ICT in the classroom and how it will positively impact their learners (Buabeng, 2012).

Harrell and Bynum (2018) assert that even with the increase in technology available in schools, professional development for educators remains a challenge and the lack of it continues to create a barrier to increasing technology adoption in classrooms. Providing educators with ICT skills, knowledge, professional development, and support leads to better integration of ICT in the classroom as educators get a better understanding of how technology can maximize the teaching and learning process (Harrell and Bynum, 2018). Therefore, to ensure the successful integration of technology into education, the execution strategy must include practical and meaningful educator professional development activities.

### 2.5.5 Accessibility

Educators' accessibility to ICT resources and infrastructure is a necessary determinant of the effective adoption and integration of ICT in the classroom (Plomp, Anderson, Law & Quale, 2009). Successful ICT integration in the classroom and teaching largely depends on the availability and readiness of ICT infrastructures such as the internet, hardware, and software (Plomp, Anderson, Law & Quale, 2009). In essence, if educators do not have access to ICT infrastructure, they cannot utilize it. Therefore, accessibility to software, hardware, computers, and the internet is key to educators' effective adoption of technology.

### 2.5.6 Technical support

Computer breakdowns, whether hardware or software, causes disturbance and if a school has no allocated technical support, there will likely be no regular repairs resulting in educators not being able to utilize computers (Yilmaz, 2011). The educators will become discouraged from using computers as no one will be available to give them technical support. Yilmaz (2011), in evaluating technology adoption, established that most schools detail technical support as a top priority for continuous and uninterrupted use of ICT.

### 2.5.7 Leadership support

Leadership support is another strong influence in ensuring ICT adoption and integration by educators in schools. According to Yilmaz (2011), school leaders who execute technology goals have a shared vision and foresight with the educators in the school in using technology for teaching and learning. Strong leadership is needed for the effective adoption of ICT by educators. Likewise, a study conducted in Hong Kong schools found that principals were the key agents in introducing ICT into schools (Yilmaz, 2011).

Similarly, Wastiau et al., (2013) found a strong relationship between digitally supportive schools and a high level of educator ICT acceptance and adoption. Digitally supportive schools are classified as schools where the leadership supports digital initiatives and has a shared vision with the educators. Furthermore, it was indicated that educators are usually ICT-confident in digitally supportive schools and use ICT in their classrooms for learning and teaching (Wastiau et al., 2013).

## 2.6 Factors that inhibit educators from adopting digital technologies in the classroom.

The speedy growth and development in ICT have resulted in extraordinary changes in the 21st century and have affected how societies interact and share information (Buabeng, 2012). ICT continues to become key in everyday life, whether in a business, social, or educational setting.

Governments all over the globe have initiated plans to introduce and increase ICT adoption in the schooling system. The frameworks have been designed to improve learning and teaching in the classroom (Buabeng, 2012). There is an increasing demand globally for learning institutions to integrate ICT and use it effectively to teach learners. According to Buabeng (2012), educators need to realize the effect of ICT on everyday life and restructure their classroom settings, facilities, and curricula to overcome the technology gap. This is important to help provide learners with knowledge to promote meaningful learning through technology, and prepare learners for the digital world (Buabeng, 2012).

Significant investment globally in ICT to improve learning and teaching in schools has been instigated by numerous governments (Buabeng, 2012). For instance, in the United Kingdom, government budget allocation on educational ICT initiatives (2008–09) was £2.5bn; in the United States, the estimated budget for ICT initiatives and educator training was $6 billion (Buabeng, 2012). In South Africa, education-related ICT initiatives only amounted to 4 million rands from the 20 billion rands allocated to education (Government Gazette, 2014). The South African government further launched a White Paper in 2004 stating that every educator, school manager, and learner in Basic Education should use ICT technologies by 2013 (Government Gazette, 2014).

Even with these investments in ICT infrastructure in South Africa. ICT adoption and usage in learning and teaching remains limited (Mlambo et al., 2020). The following section reviews factors that discourage and obstruct educators from adopting ICT in the classroom.

### 2.6.1 Educator Workload

Educator workload influences their acceptance and adoption of technology in the classroom. Samarawickrema and Stacey (2007) conducted a study on 22 educators in Australia in pursuit of understanding how educator workload affected the acceptance and adoption of technology in the classroom. The study revealed that educators with a heavy workload and who taught in overcrowded classes saw ICT as a burden and an extra activity they needed to do. These educators did not see any value added in the introduction of ICT in the schools, and they had a negative attitude towards the use of ICT in the classroom (Samarawickrema & Stacey, 2007).

Similarly, a study conducted in Sydney on ICT integration in high schools found that educators were experiencing increased workload, and the introduction of ICT was seen yet as another task that would overcrowd the curriculum and put educators under a lot of pressure (Buabeng, 2012). This shows that knowing and understanding how workload affects educators in adopting ICT is important and may help implement better ICT policies and interventions in schools.

### 2.6.2 Lack of technological competence

The lack of technical competence and skills is one of the main barriers to educator acceptance and ICT integration in the classroom (Albirini, 2006). Lack of ICT skills is a significant barrier as a less confident educator struggles to use a computer constantly and avoids it completely (Albirini, 2006). In European schools, a study was conducted to find factors preventing educators from using ICT in teaching. The study results indicated that a lack of skills and knowledge was a serious barrier (Ghavifekr, Kunjappan, Ramasamy & Anthony, 2016). Lack of competence and knowledge is not only a barrier to the integration of technology by educators, but it is also a factor that contributes to resistance to change; in essence, if educators feel less confident and competent about their ability to use ICT, they will resist the change (Ghavifekr et al., 2016).

### 2.6.3 Lack of policy framework

Currently, South Africa has a fragmented ICT policy that has a scattered approach to legislative provisions (South African Information Technology Industry Strategy, 2012). According to Mathevula and Uwizeyimana (2014), this scattered approach results from a lack of political will, a slow process in infrastructure development and a lack of funding going into ICT projects. Further, the lack of prioritization with regards to ICT by the government will result in major barriers to effectively implementing ICT in South African schools. Therefore, emphasis on an extensive and comprehensive ICT policy framework is needed.

Moreover, despite developing countries' policies to support and encourage educators to use ICT in their classrooms, ICT usage remains limited in the classroom. (Ghavifekr et al., 2016). At the educator level, there are barriers such as lack of skills, training, lack of confidence and support that makes these policies obsolete, and at the school level, barriers such as lack of ICT infrastructure, old dysfunctional hardware, restrictive curriculum, traditional education system, and lack of leadership make ICT policies futile (Ghavifekr et al., 2016).

### 2.6.4 Inadequate educator training

A research study of Yildirim (2007) research study revealed that the lack of educator training was a big barrier to integrating ICT. The research further stated that educator training was difficult to implement as educators lacked supportive leadership, a restrictive education system, lack of motivation to learn about ICT, leading to resistance to adopting ICT in the classroom (Yildirim, 2007).

Similarly, a study conducted in Cape Town, South Africa, revealed that insufficient training was a leading barrier to educators' ICT adoption. The research study further stated that even for those who received initial training in ICT, it was not enough as there was no follow-up training, insufficient technology resources, and a lack of leadership support to continue using ICT (Chigona & Chigona, 2010). This indicates that educator training is important in successfully integrating ICT into the schooling system. The emphasis cannot be placed on providing ICT infrastructure as it is not enough; educators must be trained adequately and supported to properly affect the change management process.

### 2.6.5 Educator confidence

According to Buabeng (2012), educators hesitate to use ICT as they lack confidence in using it; there is a fear around ICT as many educators do not consider themselves fully proficient in using ICT. Therefore, their lack of confidence contributes to the slow uptake of ICT integration in the classroom. The leading contributors to lack of educator confidence is not getting adequate support from school leadership, lack of time in learning new skills, and lack of technical support (Buabeng, 2012). Therefore, understanding the magnitude to which these inhibitors affect educators, can assist in deciding how they can be solved.

## 2.7 ICT competence affecting educator's implementation of digital technologies in the classroom.

The educator's ICT competence influences the learner's achievement hence the importance of educators acquiring the necessary skills to successfully integrate ICT in their teaching practice and application (Wastiau et al., 2013). This is vital as educator competence in ICT will help boost learner's digital competence (Wastiau et al., 2013). In addition, there is empirical evidence showing the relationship between educator use of ICT in the classroom and their digital competence thus, educators need to continue taking part in professional development that will affect their use and abilities to utilize ICT (Wastiau et al., 2013).

Eynon (2009) found that using ICT in an informal setting like at home helps with educators' learning experience. Further, the research demonstrated that those educators who consistently utilized ICT at home were much better at using it in the classroom, and their ICT self-efficacy was much higher than those who did not frequently use ICT at home (Eynon, 2009). Peralta and Costa (2017) found that educators with higher ICT competence were more confident and likely to adopt technology. They further found that educators who were hesitant to use technology in the classroom lacked computer knowledge and skills.

Furthermore, the study indicated that educators use lower-degree technologies to conduct duties for self-interest (Eynon, 2009). In this case, lower-degree technologies refer to social media use and internet surfing. However, the author argues that this frequent use of lower degree technologies does not translate to meaningful use of ICT in the classroom (Eynon, 2009).

Another factor that affects educator ICT competence is the age of the educators. The educator's age impacts the ICT level the educators engage within the classroom (Eynon, 2009). Research done in Australia established a generational gap in ICT use; as the age of an individual increases, the less likely they are to use ICT (Australia Communication and Media Authority, 2011).

As individuals' age increases, the frequency of online activity decreases greatly (Australia Communication and Media Authority, 2011).

Similarly, a research study conducted in South Africa found that demographics such as age, level of education and language, influenced ICT use (Blignaut, 2009). The research asserted that young people and people who form part of the prime workforce (age 25-40) are rated among high computer users and the internet (Blignaut, 2009).

Blignaut (2009) found that learners are more ICT competent when compared to educators. As the educator's age increases, their ICT competence decreases. Furthermore, learners are also cited to be more excited about integrating ICT into the classroom than educators. This emphasizes the importance of educator training and support to assist close the gap. Therefore, it is important to ensure that these technology trends do not leave behind educators.

## 2.8 Level of ICT usage in educators.

Educators must prepare the youth for the digital world in which ICT competence and the ability to process information are crucial (Drent & Meelissen, 2008). In ICT usage by educators, there are three generally accepted objectives: using ICT as the body of study, using it as an aspect of a particular profession or field, and using it as a channel to facilitate learning and teaching (Drent & Meelissen, 2008). These objectives are all important and for effective integration of ICT into the education system educators need to understand these objectives and educator professional development in ICT must cater for such (Drent & Meelissen, 2008).

The Department of Education and Higher Institutions in South Africa are responsible for educating educators in ICT applications. Education needs to focus on using ICT to enhance the learning process of learners. Using ICT effectively in the classroom can help achieve learning outcomes effectively (Drent & Meelissen, 2008). The importance of using ICT in the classroom for the educator is that, as the educators use ICT to teach, they are modelling how It can be effective in any setting.

ICT is not a tool to replace current teaching and learning procedures, but it is viewed as a vital instrument to support and supplement the current teaching methods and develop learners' skills to prepare them for the digital world (Drent & Meelissen, 2008). Hence, the importance of training educators adequately in ICT usage. Further, computers have become broadly available in the education sector, but their use for learning purposes remains vastly limited in South Africa, especially in rural and township schools (Mlambo et al., 2020). This lack of computers and ICT usage in schools can be attributed to many factors, but one major is the lack of training for educators.

School institutions have predominantly focused on providing the physical aspect of ICT, which is the infrastructure (computers). In doing so, they neglected the non-technological aspect of ICT, which is educators' support, professional development, and training (Drent & Meelissen, 2008). The focus has been on ICT essential infrastructure, but the teaching, support, and learning arrangements still largely remain unchanged (Drent & Meelissen, 2008).

In South Africa, a significant investment in ICT infrastructure has been made within different schools across the country. However, the uptake by educators has remained stagnant. Schools are struggling with providing professional development initiatives for educators to acquire digital fluency to effectively integrate ICT into the classroom (Mlambo et al., 2020). Current educators and those still in training face a reality of ongoing and growing new emerging ICTs, which brings significant challenges as educators are not well versed in these technologies. In South Africa, the availability of computing devices is growing faster than educator training (Mlambo et al., 2020).

Therefore, to realize ICT integration in education and ICT-enabled educators. It requires a serious commitment by all stakeholders to assist in developing ICT-friendly policies, supporting educator professional development, and providing sufficient training for educators and technical support.

## 2.9 Analytical Framework: Unified Theory of Acceptance and Use of Technology

A review of technology acceptance theories was conducted by Venkatesh and the team in 2003 to ascertain their usefulness in technology adoption in the modern era. The theories reviewed were Model of PC Utilization (MPCU), Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), Innovation Diffusion Theory (IDT), Theory of Planned Behaviour (TPB) and Motivational Model (MM) (Mekawie, 2013). As a cause of this review, they brought forward a new theory titled the unified theory of acceptance and use of technology (UTAUT). This new theory borrowed elements from distinctive features from older models mentioned above. The older technology acceptance models had their own limitations and one of them was that the behaviour of users is assessed through subjective means such as an individual's behavioural intention, and not a lot of emphasis is put on the external variables and their influence on technology use intention (Ajibade, 2018). Moreover, since the development of the UTAUT, there have been amendments to the theory and the development of UTAUT2 which is a supposed improvement of the UTAUT. Even with the new developments of the UTAUT, the earlier version of the model provides a comprehensive framework for understanding technology acceptance. The earlier version has been chosen for this study as it has been validated in various contexts, including studies on technology adoption in organizations, healthcare, and education. As this study focuses on the general acceptance and use of technology by educators, UTAUT is a suitable choice as it offers a comprehensive understanding of key determinants of technology acceptance.

UTAUT was developed to tackle the limitations mentioned above. UTAUT brings forward a new way of looking at how the determinants and factors of intention to use technology and behaviour change over time (Venkatesh, Morris, Davis & Davis 2003). The model is anchored on three direct causal factors of intention to use technology (social influence, effort expectancy and performance expectancy) and two direct causal factors of usage behaviour (facilitating conditions and intention). According to Venkatesh et al., (2003), these associations are mediated by experience, voluntariness, age, and gender. Looking at the previous theories

of technology acceptance, UTAUT is the only model that encompasses individual differences constructs. Looking at individual differences, more precisely, the association between perceived usefulness and intention. Venkatesh et. (2003) argued that these could be moderated by gender, experience, and age. For example, the intention to use technology and its perceived usefulness differs with age, with more young individuals showing a stronger intention to use and adopt technology (Venkatesh et al., 2003).

Below depicts the UTAUT model and its definitions:

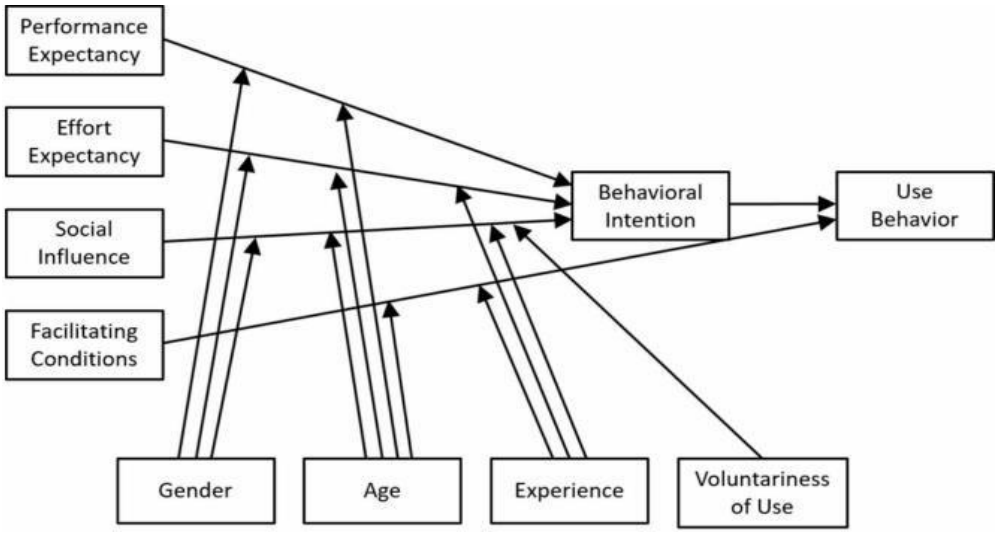


**Figure 2.1. UTAUT Model (Venkatesh et al., 2003)**

UTAUT has been standardized across technology adoption theories and serves as a useful tool that researchers can use and adapt to answer their research questions. Therefore, UTAUT has been identified as relevant the theory for this research study and since perceived usefulness serves as a strong driver of the intention to use technology, it is important to understand the factors that influence this. This theory was chosen as relevant since this research project aims to look beyond behavioural intention when it comes to ICT adoption. This research study plans on understanding how each educators' characteristics (age, experience), social factors (social influence) and external factors (support) influence them in the adoption of ICT in the classroom. It is therefore with this reasoning that UTAUT has been chosen as a theoretical framework for this research. Seven

hypotheses and four moderating hypotheses have been developed in accordance with the UTAUT model.

The following section depicts an illustration of the proposed model for educator technology adoption, shows moderators and UTAUT constructs definitions and how they inform the hypotheses of this research study.

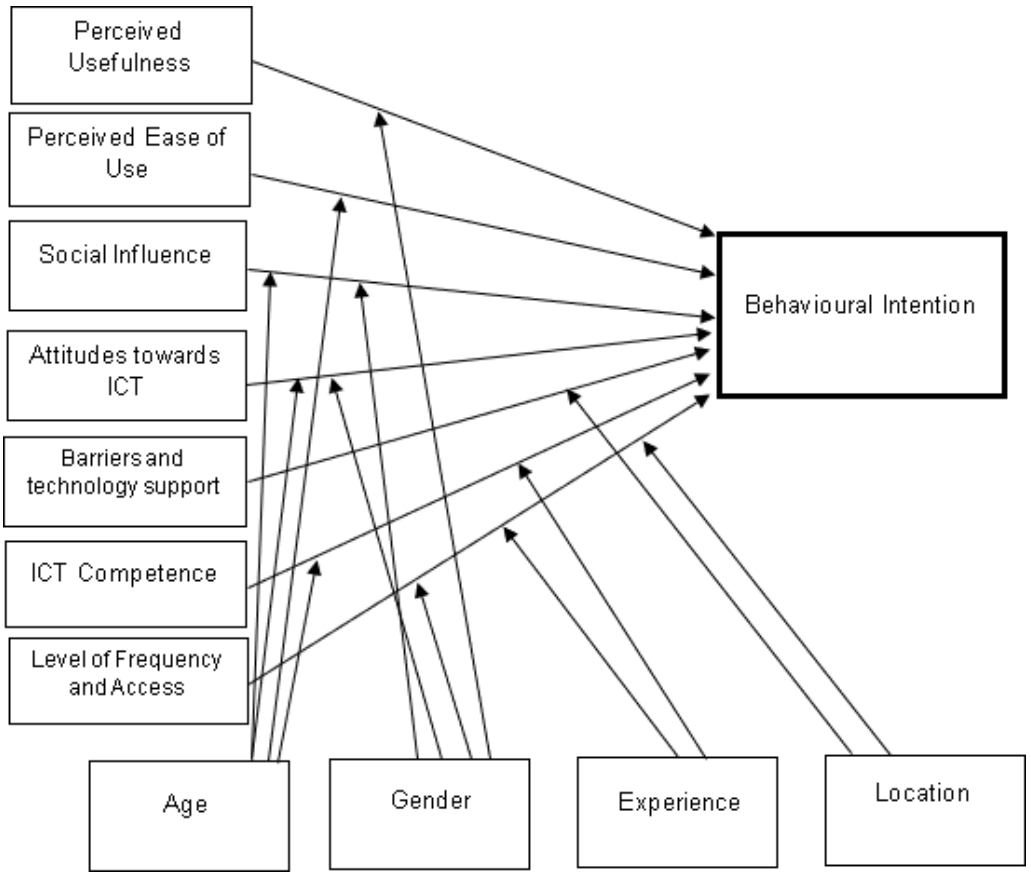


**Figure 2.2. Proposed research model showing the relationship between the constructs.**

| Moderator | Hypothesis |
|---|---|
| **Gender** | $H_1$: Educators' gender positively affects the educator's technology adoption in the classroom. |
| **Location** | $H_2$: The school's location has an influence on educators' adoption of technology. |
| **Experience** | $H_3$: The number of years teaching affects |

| | |
|---|---|
| | educator's implementation of digital technologies in the classroom. |
| **Age** | $H_4$: Age of an educator influences' educators' adoption of ICT in the classroom. |

**Table 2.1: Moderator Hypothesis**

The moderators shown in the above table assist in explaining the variations in the relationships between the core constructs of the UTAUT model. Moderators are external factors that influence the strength or direction of the relationships among the constructs. They can provide additional insights into the conditions under which the relationships specified by the theory may vary. According to Venkatesh et al., (2003), the moderators listed above affect the UTAUT constructs.

| Constructs | Definition | Hypothesis |
|---|---|---|
| **Performance Expectancy** | "The capability of the technology to provide benefits and enhance the performance to the user according to his/her expectations" (Venkatesh et al. 2003, p 447). According to UTAUT model, technology is only accepted when individuals deem it as useful and will assist them in doing the task at hand (Venkatesh et al, 2003). Hamzat and Mabawonku (2018) conducted a study on a digital library and its acceptance by educators. Performance expectancy was a leading variable for the study in determining the use of the digital library by the educators (Hamzat & Mabawonku, 2018). The study revealed that performance expectancy is a significant contributor to educator adoption of technology in the classroom. | $H_5$: Perceived usefulness will have a positive effect on educators' intention to adopt ICT. |
| **Effort Expectancy** | Effort expectancy has to do with the level of ease and comfort linked to the usage of information technology (Venkatesh et al., 2003). It is viewed as the degree of how easy it is to use a technological system. It is characterized by physical and mental efforts exerted in using a particular information technology (Venkatesh et al., 2003). Effort expectancy links the relationship between effort applied at work and the reward an individual | $H_6$: Perceived Ease of Use of ICT will have a positive effect on educators' intention to adopt ICT. |

| | | |
|---|---|---|
| | receives from it (Venkatesh et al., 2003). This ease of use determines the adoption rate of technology by individuals. | |
| **Social Influence** | "Social influence is the expected influence of others on the user to start and continue using the technology" (Venkatesh et al. 2003, p 451). Social influence is concerned with the impression of one individual's behaviour on another's (Venkatesh et al., 2003). Teo and Noyes (2011) examined the influence of social influence on the intention to use technology and found that social norms and the influence of peers do shape individuals' attitudes and acceptance of technology. Although their study focused on university students, it provides insights into the relevance of social influence within the UTAUT framework, which can be applicable to educators as well. | $H_7$: Social influence will have a positive effect on educators' intention to adopt ICT. |
| **Attitudes towards ICT adoption in the classroom.** | Educators are the implementors of technology in the classroom, and to successfully institute and execute ICT technologies, educator's attitudes towards technology are vital. This notion is supported by Demirci's (2009) research conducted on educators' attitudes in Turkey in integrating Geographic Information System (GIS) technology into the curriculum. Demirci (2009) showed | $H_8$: Attitudes towards ICT adoption in the classroom will have a positive effect on educators' intention to adopt ICT. |

| | | |
|---|---|---|
| | that while barriers such as lack of internet access and hardware infrastructure existed, educators' attitudes towards implementing GIS into the geography curriculum were vital to a successful integration (Demirci, 2009). | |
| **Barriers and Technology Support** | Yildirim (2007) research study revealed that the lack of educator training, access to ICT infrastructure and lack of good ICT policies were big barriers to integrating ICT. The research further stated that educator training was difficult to implement as educators lacked supportive leadership, a restrictive education system, lack of motivation to learn about ICT, leading to resistance to adopting ICT in the classroom (Yildirim, 2007). Similarly, a study conducted in Cape Town, South Africa, revealed that insufficient training was a leading barrier to educators' ICT adoption. The research study further stated that even for those who received initial training in ICT, it was not enough as there was no follow-up training, insufficient technology resources, and a lack of leadership support to continue using ICT (Chigona & Chigona, 2010). | $H_9$: Barriers and technology support will have a positive effect on educators' intention to adopt ICT. |

| | | |
|---|---|---|
| **ICT Competence** | The lack of technical competence and skills is one of the main barriers to educator acceptance and ICT integration in the classroom (Albirini, 2006). Lack of ICT skills is a significant barrier as a less confident educator struggles to use a computer constantly and avoids it completely (Albirini, 2006). In European schools, a study was conducted to find factors preventing educators from using ICT in teaching. The study results indicated that a lack of skills and knowledge was a serious barrier (Ghavifekr, Kunjappan, Ramasamy & Anthony, 2016). Lack of competence and knowledge is not only a barrier to the integration of technology by educators, but it is also a factor that contributes to resistance to change; in essence, if educators feel less confident and competent about their ability to use ICT, they will resist the change (Ghavifekr et al., 2016). | $H_{10}$: ICT Competence support will have a positive effect on educators' intention to adopt ICT. |
| **Level of Frequency and Access to ICT** | Educators' accessibility to ICT resources and infrastructure is a necessary determinant of the effective adoption and integration of ICT in the classroom (Plomp, Anderson, Law & Quale, 2009). Successful ICT integration in the classroom and teaching largely depends on the availability and readiness of ICT infrastructures | $H_{11}$: Level of Frequency and Access to ICT will have a positive effect on educators' intention to adopt ICT. |

| | |
|---|---|
| | such as the internet, hardware, and software (Plomp, Anderson, Law & Quale, 2009). In essence, if educators do not have access to ICT infrastructure, they cannot utilize it. Therefore, accessibility to software, hardware, computers, and the internet is key to educators' effective adoption of technology. |

**Table 2.2: UTAUT constructs definitions and how they inform the hypotheses of this research study.**

## 2.10 Summary of Hypotheses

| | Hypothesis |
|---|---|
| 1. | Educators' gender positively affects the educator's technology adoption in the classroom. |
| 2 | The school's location has an influence on educator adoption of technology. |
| 3 | The number of years teaching affects educator's implementation of digital technologies in the classroom. |
| 4 | Age of an educator influences' educators' adoption of ICT in the classroom. |
| 5 | Perceived usefulness will have a positive effect on educators' intention to adopt ICT. |
| 6 | Perceived Ease of Use of ICT will have a positive effect on educators' intention to adopt ICT. |
| 7 | Social influence will have a positive effect on educators' intention to adopt ICT. |
| 8 | Attitudes towards ICT adoption in the classroom will have a positive effect on educators' intention to adopt ICT. |
| 9 | Barriers and technology support will have a positive effect on educators' intention to adopt ICT. |
| 10 | ICT Competence support will have a positive effect on educators' intention to adopt ICT. |
| 11 | Level of Frequency and Access to ICT will have a positive effect on educators' intention to adopt ICT. |

**Table 2.3: Hypotheses of the research study.**

## 2.11 Conclusion of Literature Review

From the literature above, education still lags when it comes to ICT integration in the classroom. This lagging of ICT implementation is characterized by different factors such as lack of infrastructure, no comprehensive policy framework from the government, and lack of educator training and support. Further, this slow process of ICT implementation poses major challenges for educators and learners as ICT continues to become key in education.

Additionally, educators play a vital role in the implementation of technology in schools. For that reason, educators must be able to prepare the learners for the digital world in which ICT competence is required and the ability to process information is crucial (Drent & Meelissen, 2008). This means educator upskilling and professional development are essential activities to prioritize to achieve effective integration of ICT into the classroom. It is therefore important to study factors that contribute to educators' adoption of ICT.

# CHAPTER 3. RESEARCH METHODOLOGY

## 3.1 Research approach

A research paradigm is a research approach characterized as a set of beliefs and a common understanding of reality that apprise the researcher's actions in understanding a research problem and how it should be addressed (Connolly, 2007). Further, a research paradigm can be described as a set of common beliefs that an individual perceives the world with (Cohen, Manion & Morrison, 2007).

The research approach of this study was based on a positivist philosophy. The positivist research philosophy was deemed appropriate for this study because it is based on observable factual knowledge obtained through observation and measurement (Cameron & Price, 2009). Positivism is associated with building on proving a priori hypotheses and investigation by turning abstract concepts into quantifiable annotations through hypothesis testing (Cameron & Price, 2009). Outcomes from hypothesis testing are utilised to inform and advance the body of knowledge (Cameron & Price, 2009). Research that is based on positivism usually concentrates on identifying causal relationships or instructive associations over quantitative approaches (Cohen et al., 2007). The positivism philosophy is a method that starts with a theory observed to (a) establish testable hypotheses, (b) design an experiment through the identification of variables to operate, and (c) conduct an experiment based on an empirical data and analysis (Cohen et al., 2007). Moreover, positivism is subjected to quantifiable observations through structured methodologies that are subject to statistical scrutiny (Gill & Johnson, 2010). The philosophy relies on measurable variables utilising quantitative research methods to answer research questions (Saunders, Lewis, & Thornhill, 2009).

## 3.2 Research design

Research design is described as a framework that encompasses plans, strategy, and detailed structure to be utilised in the research study to collect and analyse information (Zikmund, Babin, Carr & Griffin, 2013). This research study used a quantitative research method to address the research question. Quantitative research is an approach that investigates the relationship between variables which means examining objective theories through testing the relationship between variables (Creswell & Creswell, 2018). Furthermore, Creswell and Creswell (2018) asserted that the quantitative approach is numbers-driven and uses closed-ended questions. The variables can be measured on instruments and typically analyzed using statistical tools (Creswell & Creswell, 2018). The quantitative approach was utilised in this research study for few a reason: first, information can be collected from a big sample of educators; second, it affords data that are specific, and the analysis can be conducted from statistical lenses and generally comparable; and third, generalisation beyond limitations of the research study location can be drawn. Quantitative research has also been used successfully in other research studies measuring educator's certain behavioural intentions, knowledge, and attitudes towards adopting digital technologies in the classroom (Hickson, 2016; Kerzic, Danko, Zorko, & Decman, 2021). These studies examined objective descriptive data and statistical clarifications of trends of behaviour in terms of educator technology adoption in the classroom.

## 3.3 Data collection method

In this research study, data was collected using closed-ended questions through a questionnaire. Field (2009) described questionnaires as the most suitable tool for conducting a quantitative research study. Questionnaires create an opportunity for the research study respondents to share freely without the researcher's influence and the researcher's presence (Field,2009). This allows respondents to choose their responses openly and helps build objective analysis.

The table below looks at the advantages (Pros) and disadvantages (Cons) of using a questionnaire:

| Pros | Cons |
|---|---|
| - Questionnaires are inexpensive and easy to administer.<br>- They allow the researcher to reach a large pool of respondents.<br>- Respondents can fill it in anywhere which allows the researcher to collect data quickly.<br>- It provides anonymity and this results in respondents feeling more candid.<br>- It gives little to no researcher subjectivity and data collected from the questionnaire is quantifiable.<br>- It allows for standardization in data collection. | - It can allow for dishonest answers as respondents fill it on their own.<br>- It opens the possibility of skipped questions which will affect the data accuracy.<br>- Research respondents may not finish filling in the questionnaire, and this may cause data inaccuracy.<br>- The research instrument may pose a language barrier issue for some individuals who may not understand some questions. |

**Table 3.1 Pros and Cons of questionnaires.**

## 3.4 Population and sample

### 3.4.1 Population

The target population for this research study included public high school educators in Gauteng province. There are currently 70 344 educators in the Gauteng province who teach in public schools (Department of Education, 2019). The educators in this research study were of any race, gender, and age if they teach in a public high school. The educators had access to a smart mobile device or laptop with the internet for them to be able to engage with the online survey. The targeted population varied in the number of years teaching, the schools represented in this study were public high schools, and the school's locations were both urban and township.

### 3.4.2 Sample and sampling method

The sampling method utilized was a non-probability method. In a non-probability sampling method, a non-random standard is applied when selecting individuals because not everyone has an equal chance of being selected (Bhattacherjee, 2012). This sampling method was chosen as it is easier to access the population. The technique that this study utilized to access the population was through a convenient sample. A convenience sample technique was chosen because it is inexpensive, fast, easy, and allows for a sizeable number of respondents (Bhattacherjee, 2012). The method of sampling occurred through asking the Department of Education in Gauteng to assist in identifying and circulating the questionnaires to suitable high school educators in the province.

This research study is quantitative, and therefore it was necessary to have a big enough sample to conduct statistical analysis (Field, 2009). According to Field (2009), the minimum sample size is 100, and as a rule, a minimum of 10 respondents must be observed for each variable. This is crucial as a larger sample size improves the statistical power allowing the researcher to find statistical differences in the relationship between the observed variables (Field, 2009). A sample size calculator with a 5% margin of error, a 95% confidence level was used, and this was calculated based on the current 70 344 educator population size in Gauteng. The recommended sample size was 383.

## 3.5 The research instrument.

An online questionnaire that respondents can self-complete was utilized for this study. No researcher assistance was required for respondents to answer the questionnaire as instructions were detailed on the research instrument, and each question was simplified and easy to read and understand. The online questionnaire is easy to administer, it can reach more people faster, and scalability is limitless (Bhattacherjee, 2012). The online questionnaire was chosen as it is easy to use, grants broader geographic reach enables objectivity, allows for confidentiality, and permits research respondents to input answers themselves without the presence of the researcher (Bhattacherjee, 2012).

## Measures

In this research study, eight constructs informed the research instrument. Each construct has been adapted from multiple works of literature to suit this particular research study's objectives. The items of each construct will be carefully measured on a 5- point Likert, with responses 1(strongly disagree), 2 (disagree), 3(neutral), 4(agree), and 5(strongly agree).

The table beneath depicts the constructs in the research instrument.

| Construct | Number of Items | Scale | Reliability | Literature Source |
|---|---|---|---|---|
| Perceived Usefulness of ICT. | 7 | Likert 1-5 | Cronbach's 0.87 | Davis (1989) Luan & Teo (2009). |
| Perceived Ease of Use of ICT. | 5 | Likert 1-5 | Cronbach's 0.98 | Luan & Teo (2009). |
| Intention to Use ICT in the classroom. | 5 | Likert 1-5 | Cronbach's 0.82 | Davis (1989), Luan & Teo (2009), Venkatesh& Davis (2000). |
| Attitudes towards ICT adoption in the classroom. | 16 | Likert 1-5 | Cronbach's 0.78 | Davis (1989), Luan & Teo (2009), Venkatesh& Davis (2000). |
| Barriers and technology support. | 14 | Likert 1-5 | Cronbach's 0.73 | Gulbahar & Guven (2008), Ghavifekr et al., (2016), Venkatesh& Davis (2000). |
| ICT Competence | 7 | Likert 1-5 | Cronbach's 0.80 | Albirini (2006), Ghavifekr et al., (2016), Venkatesh& Davis (2000). |

| | | | | |
|---|---|---|---|---|
| Level of Frequency and Access to ICT | 5 | Likert 1-5 | Cronbach's 0.88 | Gulbahar & Guven (2008), Ghavifekr et al., (2016), Venkatesh& Davis (2000). |
| Social Influence | 5 | Likert 1-5 | Cronbach's 0.81 | Ghavifekr et al., (2016), Venkatesh& Davis (2000). |

**Table 3.2: Summary of the Research Instrument.**

## 3.6 Procedure for data collection

This study utilised an online questionnaire that was used as the primary method of collecting data. The questionnaire was created using an online survey platform Qualtrics. Before administering the online questionnaire to research respondents, a small pilot was carried out to test the useability of the questionnaire. After the small pilot was concluded, the final questionnaire was sent to educators. This was done by requesting permission from the Department of Education in Gauteng to administer the questionnaire. The Department granted permission to administer the questionnaire. The Head of Research at the Department assisted in ensuring that the questionnaire was distributed to educators in Gauteng timeously through a broadcast email that went to different schools in the province. The survey consisted of close-ended questions on a 5-point Likert scale. All research respondents were aware of the purpose of the study and informed consent, confidentiality, and anonymity was guaranteed.

## 3.7 Data analysis and interpretation

The data collected in this research study was analysed using the Statistical Package for Social Scientists (SPSS). The data came from Qualtrics and exported to SPSS for analysis. Data was analysed using descriptive and inferential statistics through SPPS computer software. Descriptive statistics were used to conduct subgroup analysis, looking at differences between male and female educators, years of experience and age. The descriptive analysis was done using frequencies, percentages, ranges, counts, and means.

Inferential statistics were used to test the differences and relationships between variables. The processing of data and analysis was directed by the objectives of the research study and the theoretical framework. Categories were established, data was coded and loaded into SPSS. The inferential statistics performed were independent t test, Factor analysis, Cronbach's coefficient alpha and Spearman correlation. These analyses were performed for each hypothesis listed in chapter two.

## 3.8 Limitations of the study

The list of limitations:

- The results of this research study must be considered with specific significant limitations. The size of population was 104 educators who completed the research survey. Though strong patterns emerged from the collected data, a more representative and greater sample could have provided the opportunity to identify richer patterns in the data.

- The difficulty in accessing educators due to the Department of Education policy in Gauteng made it challenging to reach many educators as one needed to go through a length process that had long turnaround times.

- A non-probability sampling method was utilised, and this resulted in the difficulty in ensuring that the targeted population was represented.

- The study was quantitative in nature, this neglected the ability to get an in-depth understanding of the educators' lived experiences and their struggles in integrating ICT in the classroom. Quantitative research overlooks the importance of broader themes and inner experiences and how they shape the educator's perception of ICT. Hence, a richer conclusion might have been drawn if the research was a mixed method research design.

## 3.9 Validity and Reliability

Validity refers to how the research instrument accurately measures the outcomes of the research objectives, and reliability refers to the questionnaire's consistency (Bhattacherjee, 2012). Discriminant validity is a subtype of construct validity as it shows the researcher how well a particular test measures the notion it was constructed to measure (Bhattacherjee, 2012). To measure discriminant validity, the KMO and Bartlett's Test and Factor Analysis following tests were conducted.

### 3.9.1 External validity

External validity refers to the applicability of the research study to other different contexts (Bhattacherjee, 2012). Factors that might impact external validity in this study are the sample that was not randomly selected, which opens possibilities to selection bias. This means the results of this study cannot be generalized to other social settings and the entire educator population in South Africa. To mitigate external validity issues, the research respondents were all randomly chosen.

### 3.9.2 Internal validity

Internal validity refers to the observed results of the study in reflecting the truth about a population and giving a degree of confidence that causality being evaluated is trustworthy (Bhattacherjee, 2012). Defining properly the target population and matching the sample frame close to the defined target population will reduce sampling bias (Bhattacherjee, 2012). To ensure validity, the internal consistency of the items in the questionnaire was measured and proved to be satisfactory.

### 3.9.3 Reliability

Reliability refers to the consistency of responses coming from the questionnaire (Bhattacherjee, 2012). To ensure reliability, Cronbach’s Alpha of 0.7 and above was obtained to ensure the reliability of the questionnaire. Furthermore, some constructs included in the research instrument have been tested before by other researchers, and reliability was established. However, given the constructs included were tested in a different context, it is important to validate and test for

reliability within this research study context. To ensure reliability in this research study, the internal consistency of the items in the questionnaire was measured using Cronbach's coefficient alpha (α). This process was utilised to identify the relationship between the scores of each item. A satisfactory Cronbach's alpha value of more than .65 with the highest alpha level at .972 was attained.

## 3.10 Construct and Discriminant Validity

Discriminant validity is a subtype of construct validity, showing the researcher how well a particular test measures the notion it was constructed to measure (Bhattacherjee, 2012). Considering construct and discriminant validity is essential to ensure the reliability and validity of the measurement instruments used. In this research, these tests were conducted to consider construct and discriminant validity. There were: KMO and Bartlett's Test, Factor Analysis, Scree Plot and Cronbach's alpha analysis.

## 3.11 Demographic profile of respondents

| Item | Category |
|---|---|
| Gender | Male, Female |
| Age Group | All |
| Years Teaching | All |
| Years teaching with ICT | All |
| School Location | Suburb, Township |
| School Type | Public Highschool |

**Table 3.3: Demographic profile of respondents.**

## 3.12 Ethical considerations

Considerations such as integrity, respect, honesty, confidentiality, informed consent, and openness are important to ensure ethical research (Babbie, 2013). This research study considered these ethical considerations when collecting, interpreting data, and interacting with research respondents. Some of these ethical considerations are listed below:

- Integrity and transparency were maintained throughout the entire research

process by publicly availing the research outcomes.

- In maintaining confidentiality, the research study ensured the research respondents' anonymity by omitting their personal information from data collection.

- All research respondents were given the utmost respect through communicating with empathy and showing appreciation for their participation.

- Informed consent was obtained from all the research respondents.

- Research respondents were not subjected to any harm in participating in this research study.

**Table 3.4: Consistency table.**

| RQ | Research Question Objective | Hypothesis | Data collection detail | Data analysis method |
|---|---|---|---|---|
| 1. | To investigate factors that contribute to educator willingness to adopt digital technologies in the classroom. | Educators' gender positively affects the educator's technology adoption in the classroom. | Questionnaire Likert 1-5 | An independent samples t-test |
| | | Attitudes towards ICT adoption in the classroom will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |
| | | Social influence will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |
| | | Perceived usefulness will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |
| | | Perceived Ease of Use of | | |

| RQ | Research Question Objective | Hypothesis | Data collection detail | Data analysis method |
|---|---|---|---|---|
| | | ICT will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |
| 2. | To investigate factors that inhibit educators from adopting digital technologies in the classroom. | The school's location has an influence on educator adoption of technology. | Questionnaire Likert 1-5 | An independent samples t-test |
| | | Barriers and technology support will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |

| RQ | Research Question Objective | Hypothesis | Data collection detail | Data analysis method |
|---|---|---|---|---|
| 3. | To determine whether ICT competence affects how educators implement digital technologies in the classroom. | The number of years teaching affects educator's implementation of digital technologies in the classroom. | Questionnaire Likert 1-5 | Spearman correlation |
| | | ICT Competence support will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |
| 4. | To investigate the level of ICT usage in educators. | Age of an educator influences' educators' adoption of ICT in the classroom. | Questionnaire Likert 1-5 | Spearman correlation |
| | | Level of Frequency and Access to ICT will have a positive effect on educators' intention to adopt ICT. | Questionnaire Likert 1-5 | Spearman correlation |

| RQ | Research Question Objective | Hypothesis | Data collection detail | Data analysis method |
|---|---|---|---|---|
| | | | | |

# CHAPTER 4. PRESENTATION OF RESULTS

## 4.1 Introduction

This research study chapter reported on the findings and data analysis. The study aimed to investigate the factors contributing to educators' adoption of digital technologies in the classroom, focusing on public high school educators in Gauteng, South Africa. An online questionnaire that respondents can self-complete was utilised for this study. This questionnaire was delivered by email to the selected educators in the geographical areas of Gauteng. The total number of educators who filled in the questionnaire was (*N=104*). The educators were of any race, gender, age and teaching in a public high school. The educators varied in the number of years teaching and the school's location.

In this research study, eight constructs informed the research instrument. Each construct has been adapted from multiple works of literature to suit this research study's objectives. The items of each construct were carefully measured on a 5-point Likert, with responses 1(strongly disagree), 2 (disagree), 3(neutral), 4(agree), and 5(strongly agree).

## 4.2 Demographics of the Respondents

The biographic information depicted in the table below shows the composition of the gender of respondents, age, location, number of years teaching and number of years teaching using ICT. All this information is summarised in the table 4.1 below.

| Variable | Number | Percentage |
|---|---|---|
| **Gender:** | | |
| Male | 49 | 47.1 |
| Female | 55 | 52.9 |
| **Age:** | | |
| Under25 | 11 | 10.6 |

| | | |
|---|---|---|
| 26-35 | 48 | 46.2 |
| 36-45 | 17 | 16.3 |
| 46-55 | 22 | 21.2 |
| 56 and older | 6 | 5.8 |
| **Location:** | | |
| Urban | 36 | 34.6 |
| Township | 68 | 65.4 |
| **No. of Years Teaching:** | | |
| Under 5 | 41 | 39.4 |
| 6-10 | 22 | 21.2 |
| 11-15 | 12 | 11.5 |
| 16-20 | 9 | 8.7 |
| 21-25 | 7 | 6.7 |
| 26-30 | 8 | 7.7 |
| 31-35 | 3 | 2.9 |
| 36 and above | 2 | 1.9 |
| **Years teaching with ICT:** | 93 | 89.4 |
| Under 5 | 10 | 9.6 |
| 6-10 | 1 | 1.0 |
| 11-15 | | |

**Table 4.1: Demographics of the research respondents (N=104).**

Table 4.1 shows the gender findings which indicate that there were more female respondents when compared to males. Females were at 52.9% and males were at 47.1%. The location of schools where educators were based was 34.6% based in urban areas and 65.4% in townships. Concerning age, the research respondents were categorized as follows under 25, 26-35, 36-45, 46-55, 56 and older. Most of the respondents were in the age category of 26-35 years (46.2%), the following category was 46-55 years (21.2%), followed by 36-45 years (16.3%), under 25 years (10.6%) and lastly 56 and older years (5.8%).

Looking at the number of years teaching, the table above shows out of the 104 educators who responded to the survey, 39.4% had a teaching experience of under 5 years, 21.2% were between 6-10 years, 11.5% were between 11-15 years, 8.7% were between 16-20 years, 6.7% were between 21-25 years, 7.7% were between 26-30, 2.9% were between 31-35 years and 1.9% had teaching experience of 36 years and above. The average educator teaching experience was 11 years. Additionally, looking at the number of years teaching with ICT, of the 104 educators who responded to the survey, 89.4% had a teaching

experience using ICT of under 5 years, 9.6% were between 6-10 years, and 1% were between 11-15 years.

The average educator teaching experience using ICT in the classroom was 3 years indicating that most respondents have not used ICT in the classroom extensively and over a longer period. According to Olson, Obrien, Rogers and Charness's (2011) research study on technology frequency of use for younger and older adults, they classified individuals between the ages of 20-29 as accepting and pro-technology as they grew up in times when technology is widespread and individuals in the upper ages were classified as surviving with the challenges of technology as it develops and become widespread. According to these researchers, this trend in age gaps and frequency of use impacts the different individual's choices and attitudes towards technology adoption (Obrien et al., 2011).

## 4.3 Descriptive Statistics

The data collected from the research study respondents were gathered using an online questionnaire and analysed using the Statistical Packages for the Social Sciences (SPSS). The research respondents in this study were made up of 104 high school educators. They varied in race, experience, subjects taught, as well as gender. This was analysed using frequencies, percentages, ranges, counts, and means. The 104 research respondents' scores ranged between 1 and 5. The interpretation of the mean range scale was as follows:

| Mean Range | Response | Description | Interpretation |
|---|---|---|---|
| Above 3.75 | Strongly agree. | Agree with no doubt. | Very high |
| 3.00- 3.74 | Agree. | Agree with doubt. | High |
| 2.99- 2.60 | Neutral. | Not sure. | Moderate |
| 2.59-2.00 | Disagree. | Disagree with doubt. | Low |
| Below 2.00 | Strongly disagree. | Disagree with no doubt. | Very Low |

**Table 4.2: The interpretation of the mean scores range.**

### 4.3.1 Results of Analysis of Scales from Questionnaire

The table below shows the summarised data generated from the descriptive statistics for educators' scores on the items on the questionnaire administered. The descriptive statistics looked at the mean scores, educator median, range, and standard deviation.

| Statistics | Usefulness of ICT | Ease of use | Intention | Attitude | Barriers | ICT Competence | Social Influence | Frequency and access |
|---|---|---|---|---|---|---|---|---|
| Mean | 4.37 | 3.96 | 3.93 | 3.60 | 4.01 | 4.16 | 4.13 | 2.21 |
| Median | 4.85 | 4.20 | 4.00 | 3.50 | 4.20 | 4.66 | 4.40 | 1.66 |
| Mode | 5.00 | 5.00 | 5.00 | 3.50 | 5.00 | 5.00 | 5.00 | 1.00 |
| Std. Deviation | .894 | 1.190 | 1.051 | .465 | .978 | 1.091 | .955 | 1.334 |
| Minimum | 1.00 | 1.00 | 1.00 | 2.19 | 1.00 | 1.00 | 1.00 | 1.00 |
| Maximum | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

**Table 4.3: Summarised data generated from the descriptive statistics for educators' scores.**

**i) Perceived Usefulness of ICT**

According to Table 4.3, educators' perceived usefulness of ICT in the classroom showed high levels. The educators scored high on this item (*M = 4.37, SD = .894*). This is an indication that educators see ICT in the classroom as valuable and useful. Some of the items that educators scored high on were 'Computers are going to make teaching better and easier' (*M = 4.49, SD = .955*), 'The availability of computers must be regarded as high priority for educators' (*M = 4.40, SD = .982*) and 'Using technology and computers in the classroom makes

school subjects interesting' (*M = 4.48, SD = .944*). As the results demonstrated in the summarised table above, the statement of perceived usefulness of ICT by educators was highly rated.

**ii) Perceived Ease of Use of ICT**

The perceived ease of use of ICT by educators in the classroom showed moderate levels. The educators scored moderately on this item (*M = 3.96, SD = 1.190*). This is an indication that not all educators perceive ICT as easy to navigate and utilise. Some of the items that educators scored moderate on were 'When using a computer, I do not put in much mental effort to understand the system' (*M = 3.73, SD = 1.314)* and 'Navigating computers is easy' (*M* = 3.97*, SD* = 1.273). Furthermore, there was a clear distinction between age groups, educators between the ages of 46-56 years and older scored low on perceived ease of use of ICT and educators under 35 years scored high.

**iii) Intention to Use ICT in the classroom**

The intention to use ICT in the classroom scale presented moderate levels. The educators scored moderately on this item (*M* = 3.93*, SD* = 1.051). This indicates that not all educators intend to use ICT in the classroom. Some of the items that educators scored moderately on were 'I often use technology such as a computer and other technology (tablets, smartboards) tools in my classroom' (*M* = 3.91*, SD* = 1.121) and 'I intend on regularly using a computer in my lessons' (*M* = 3.65*, SD* = 1.352). The mean scores reveal that educators do not frequently incorporate ICT in their classrooms.

**iv) Attitudes towards ICT adoption in the classroom**

The educators' attitudes towards ICT adoption in the classroom scores indicated moderate levels. Most educators had a positive viewpoint on the use of technology in the classroom. Some of the items that educators scored moderately on were 'Despite the limitation I may have experience in accessing technology and computers; I have a positive attitude about the use of technology in the classroom.' (*M* = 4.45*, SD* = .804) and 'Computers and technology are good at enhancing the learning process for learners' (*M* = 4.50*, SD* = .765). This confirms

the positive outlook by educators towards ICT and emphasises the idea that educators generally concur that using computers is important (Voogt, Knezek, Cox, Knezek, & Brummelhuis, 2013, as cited in Felix, 2021).

**v) Barriers and technology support**

Even though educators have a positive attitude toward the use of technology in the classroom, some barriers inhibit educators in utilising ICT. The descriptive statistics on barriers and technology support indicate that educators strongly agree with the statements on the questionnaire. The educators scored high on this item (*M* = 4.01*, SD = .978*). This is an indication that without dealing with ICT barriers, the meaningful implementation of ICT in the classroom cannot be fully realised.

Most educators indicated that the implementation of ICT was challenging mostly due to the absence of educational infrastructure, support, and resources. Some of the items were 'Lack of educator training in using technology and computers' (*M* = 4.37*, SD = 1.055*), 'There are not enough computers to use for all educators in the school' (*M* = 4.46*, SD = 1.067*) and 'The use of technology and computers is not a priority in my school.' (*M* = 3.96*, SD = 1.442*). The results demonstrate that educators agree on the barriers to ICT in the classroom and how these could affect educators from utilising ICT effectively.

**vi) ICT Competence**

ICT competence is concerned with the ability to utilise it, an individual must have a level of understanding and skill. The descriptive statistics indicate that most educators in the research study had a good level of ICT competence. Educators scored moderately high on the items pertaining to the use of a computer and being able to use the internet for various operations (searching, email, chat, etc.). Some of the items that educators scored high on were 'I can use a computer keyboard' (*M* = 4.37*, SD* = 1.116), 'I can access all sorts of information on the web for my classroom content' (*M* = 4.14*, SD* = 1.223), and 'I can do a PowerPoint presentation by myself (*M* = 4.08*, SD* = 1.300). The results demonstrate that the majority of the educators in the research study were ICT-competent.

### vii) Social Influence

Social influence is concerned with the impression of one educator's behaviour on another's. The social influence item was intended to ascertain whether educator's family, friends and colleagues influence the educator in adopting ICT in the classroom. The questionnaire results indicated that educators regard social influence as important and strongly believe that they would use technology in the classroom if it was used by people they regard as important.

According to the descriptive statistics, social influence items showed high levels. The educators scored high on this item (*M* = 4.13*, SD* = *.955*). This is an indication that educators regard social influence as a factor in their process of adopting ICT in the classroom. Some of the items that educators scored high on were 'My colleagues motivate me to use technology in the classroom' (*M* = 4.11*, SD =1.050*). Alshmrany & Wilkinson (2017) indicated that if the environment (school, family, support, and friends) is technology orientated, the chances of educators being interested in adopting technology in their classrooms is high.

### viii) Level of Frequency and Access to ICT

Research study respondents were requested to rate their level of access and use of ICT at school, home, and other places. The results revealed that most educators do not have full access to a computer at school or home. The mean frequency and access level to ICT was (*M: 2.21, SD =1.334).* Educators' mean score indicates that most educators on the research study access ICT twice a week and once a week. Some of the items that educators scored low on were 'I do have access to a computer at home, and I use it frequently' (*M : 2.08, SD*=1.532*),* 'I surf the internet frequently at home using a computer or my mobile phone' (*M : 1.89, SD* =1.455*), '* I use my computer for work' (*M : 2.36, SD*=1.586*),* and 'I use my mobile phone for work' (*M : 1.80, SD* =1.354*).*

### 4.3.2 Frequency and Access to ICT (computer usage for work)

| Frequency | Under 25 | 26-35 | 36-45 | 46-55 | 56 and older |
|---|---|---|---|---|---|
| Daily | 5 | 32 | 7 | 7 | 0 |
| 2 times a week | 2 | 5 | 1 | 1 | 0 |
| Once a week | 1 | 3 | 4 | 4 | 1 |
| Once a month | 2 | 3 | 2 | 2 | 0 |
| Never | 0 | 3 | 8 | 8 | 5 |

**Table 4.4: Frequency and Access to ICT.**

Table 4.4 shows the frequency and access to ICT between educator age groups. Educators aged 46 and above reported less frequency and access to ICT compared to those aged 45 and younger. This confirms the classification made by Olsone et al., (2011) the younger generation is pro-technology, and the older generation tends to struggle with technology adoption. Additionally, there were also a few educators who mentioned that they have never used technology or a computer for school related tasks.

### 4.3.3 Availability of computers in schools

| | | Urban | Township |
|---|---|---|---|
| There are not enough computers to use for all educators in the school. | Strongly Disagree | 17 | 1 |
| | Disagree | 1 | 2 |
| | Neutral | 2 | 2 |
| | Agree | 5 | 11 |
| | Strongly Agree | 8 | 48 |

**Table 4.5: Availability of computers in schools (not enough computers to use for all educators in the school).**

Table 4.5 above shows a further division between urban and township schools. Educators based in township schools indicated major lack of ICT infrastructure in their schools. This poses major challenges as access to ICT resources and school infrastructure is required to incorporate ICT in education (Plomp, Anderson, Law, & Quale, 2009). Evidently, if educators do not have access to ICT, then the frequency and usage of ICT will be low or non-existent. Thus, access to technological resources such as computers, hardware and software

are crucial fundamentals to successfully adopting and integrating technology in the classroom (Plomp et al., 2009).

### 4.3.4 Challenges of ICT adoption by educators.

The following illustrations show chronologically the top challenges cited by educators from both the urban and township schools as major hindrances in fully adopting ICT in the classroom.

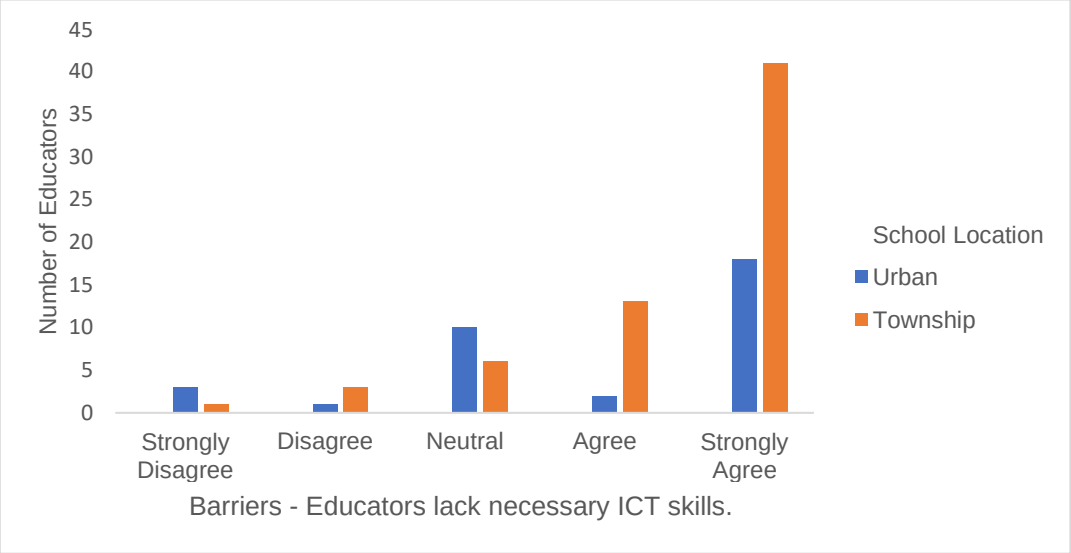


**Figure 4.1: Bar graph indicating major challenges of ICT adoption by educators.**

Figure 4.1 shows that the lack of necessary ICT skills was highly rated by educators as a major challenge in adopting ICT in the classroom. Both educators from the urban and township schools cited ICT skills as a big challenge. Skills and knowledge are prerequisite in ICT adoption and if educators lack the skills necessary for ICT adoption, this will result in slow progress towards the adoption and integration of ICT in the classroom.

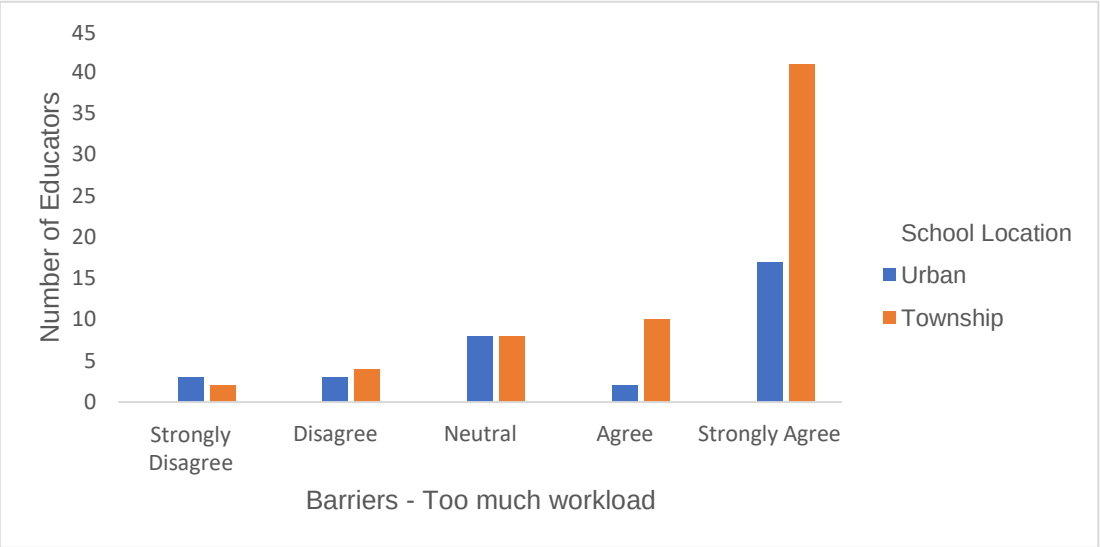


**Figure 4.2: Bar graph indicating major challenges of ICT adoption by educators.**

Figure 4.2 above shows the second most rated challenge cited by educators from both the urban and township schools. Too much workload was cited as the second challenge by educators. This challenge results in educators seeing ICT adoption as an added burden to their busy schedule. Thus, preventing educators from seeing ICT as an enabler and a tool that can enhance the learning and teaching experience in the classroom.

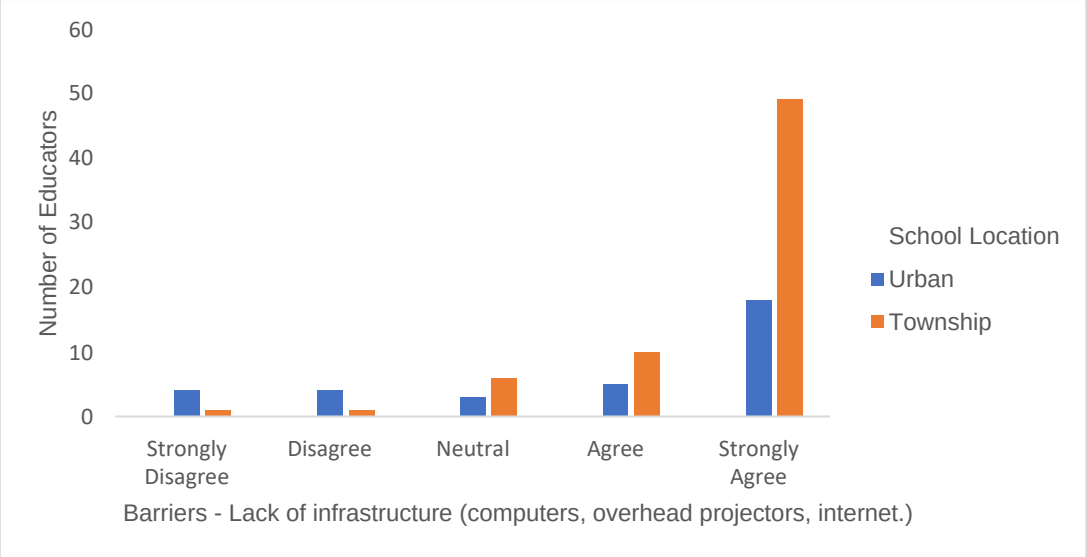


**Figure 4.3: Bar graph indicating ICT frequency and access of educators.**

Figure 4.3 shows the third challenge cited by educators from both urban and township schools as a major hindrance in fully adopting ICT in the classroom.

This challenge was the lack of infrastructure such as computers, overhead projectors, and the internet.

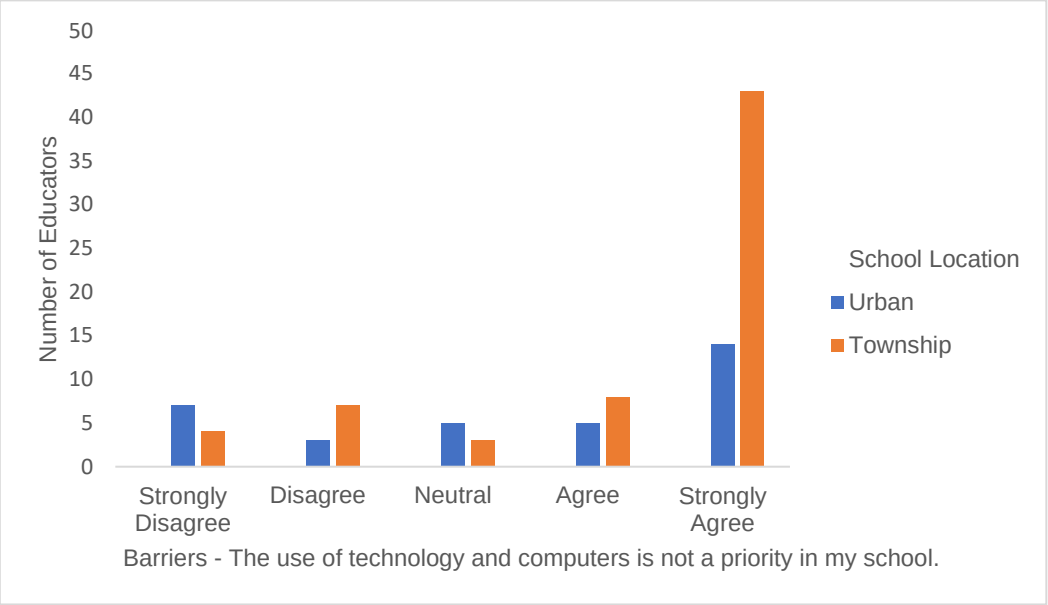


**Figure 4.4: Bar graph indicating ICT frequency and access of educators.**

Figure 4.4 shows the third challenge cited by educators from both urban and township schools as a major hindrance in fully adopting ICT in the classroom. The educators indicated that the use of technology and computers is not much of a priority in their schools.

## 4.4 Inferential Statistics

Inferential statistics were conducted based on the data that came from the quantitative survey. The processing of data and analysis was directed by the objectives of the research study and the theoretical framework. Categories were established, data were coded and loaded into SPSS. The statistical analysis assisted in describing variables that affect technology adoption by educators. The inferential statistics performed were independent t-test, Factor analysis, Cronbach's coefficient alpha and Spearman correlation. These analyses were performed for each hypothesis listed in chapter two.

### 4.4.1 Validity and Reliability

The internal consistency of the items in the questionnaire was measured using Cronbach's coefficient alpha (α). This process was utilised to identify the relationship between the scores of each item. A satisfactory Cronbach's alpha value is between .65 – .95 (Ghavifekr et al., 2016).

| | Cronbach's Alpha | No. of Items |
|---|---|---|
| Perceived Usefulness | .965 | 7 |
| Perceived Ease of Use | .972 | 5 |
| Intention to Use | .917 | 4 |
| Attitudes towards ICT | .693 | 16 |
| Barriers and technology support | .952 | 15 |
| ICT Competence | .970 | 9 |
| Social Influence | .928 | 5 |
| Level of Frequency and Access | .931 | 6 |

**Table 4.6: The internal consistency of the items in the questionnaire.**

Table 4.6 above indicates that the instrument was reliable. All items in the instrument consisted of α level of more than .65 with the highest alpha level at .972 and the lowest at .693.

### 4.4.2 Construct and Discriminant Validity

Discriminant validity is a subtype of construct validity as it shows the researcher how well a particular test measures the notion it was constructed to measure (Bhattacherjee, 2012). To measure discriminant validity, the following tests were conducted:

#### 4.4.2.1 KMO and Bartlett's Test

To verify the construct validity of the survey items, the Exploratory Factor Analysis (EFA) was performed. For this, orthogonal rotation was utilised and principal components. The motive for utilising these methods was for the reason that they are the most used by researchers in practice and are usually considered if the researcher believes that a relationship between factors exists. The orthogonal rotation method was used as it simplifies the interpretation of the factors and minimises high loading variables (Field, 2009). To start with the Factor Analysis, the Kaiser-Meyer-Olkin (KMO) was conducted. This test was performed to check how the factors describe each other (partial correlation) between the items. For the KMO value to be considered acceptable it must be closer to 1.0 and anything less than 0.5 is unacceptable (Field, 2009). From the KMO analysis test, the sampling adequacy value was .807, indicating an adequate sample size for an EFA to be conducted.

| KMO and Bartlett's Test | |
|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | .807 |
| Chi-Square | 419.070 |
| df | 28 |
| Sig. | <.001 |

**Table 4.7: KMO and Bartlett's Test.**

#### 4.4.2.2 Factor Analysis

The first step taken in doing the factor analysis was to establish the sum of factors to obtain. The principal component analysis indicated that three factors should be extracted. Normality was assumed in extracting factors and varimax was used to perform the analysis.

| Component | Factor 1 | Factor 2 | Factor 3 | Communality |
|---|---|---|---|---|
| 1 | .901 | | | .648 |
| 2 | .886 | | | .819 |
| 3 | .884 | | | .799 |

| | | | | |
|---|---|---|---|---|
| 4 | -.881 | | | .863 |
| 5 | .642 | | .484 | .782 |
| 6 | | .893 | | .845 |
| 7 | -.319 | .793 | | .854 |
| 8 | | | .920 | .807 |
| **Eigenvalues** | 3.876 | 1.522 | 1.019 | |
| **Variance Explained** | 48.452 | 19.020 | 12.732 | |
| **Total Variance Explained** | | 80,204 | | |

**Table 4.8: Results from the Factor Analysis.**

Table 4.8 shows that the survey instrument comprised three sub-dimensions (factors), and the three factors described 80.204% of the total variance. According to these results, it can be deduced that the research instrument has a valid feature. Additionally, the first factor explains 48.452% of the variance, the second factor explains 19.020% and the last factor explains 12.732% of the variance. The table above demonstrates the dispersal of the items agreeing to the factors and their factor loads.

The Communality column in table 4.8 shows the amount of variance the three factors explain for each item. Values that are closer to 1 are good and acceptable. The least was (.648) from component 1, and the most variance was (.863) from component 4. In summary, the three factors explain a large amount of the variance and drive the values of the 8 items measured in the research instrument.

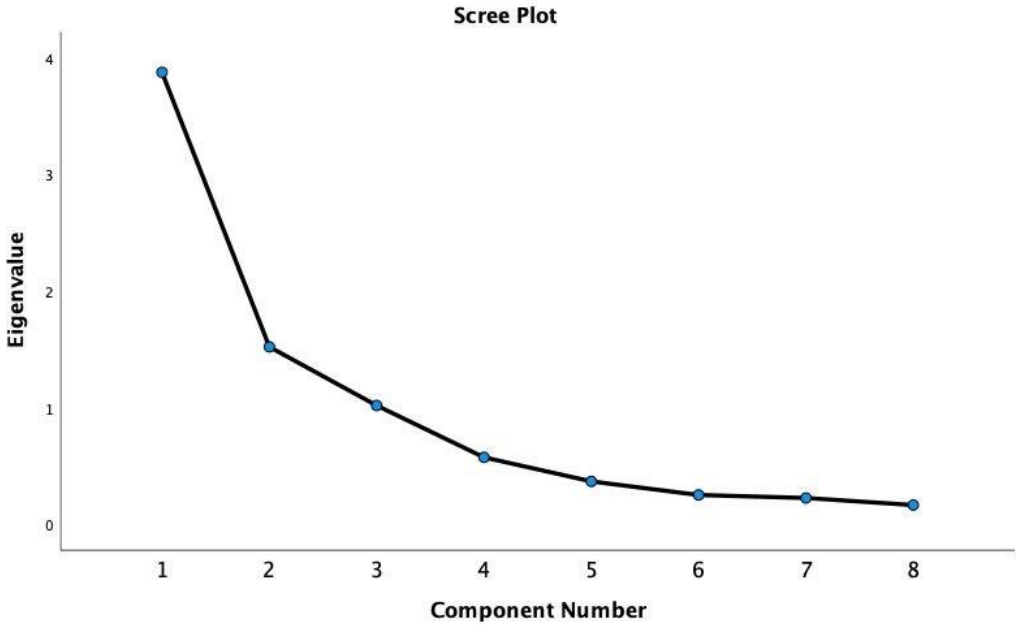


**Figure 4.5: Scree Plot.**

The scree test is a representation of the eigenvalues in a graphical form (Bartholomew et al., 2008). Figure 4.5 above shows that there were only three factors with eigenvalues above 1, indicating that the three factors were substantial and leaving the other factors as less considerable.

The data in the following sections of this chapter were presented by the four objectives of the study:

### 4.4.3 Hypothesis Testing

**Objective 1:** To investigate factors that contribute to educators' willingness to adopt digital technologies in the classroom.

**$H_1$:** Educators' gender positively affects the educator's technology adoption in the classroom.

An independent t-test was conducted to compare the differences in educators' technology adoption in the classroom between females and males. The independent samples t-test was chosen to compare the means of the two groups (females and males). The independent samples t-test is appropriate as it helps determine whether the two-population means are significantly different (Field,

2009). Further to determine the suitability of the test, the data were assessed for normality and the distributions of data were sufficiently normal for allowing to conduct a t-test and the assumption of homogeneity of variances was tested and fulfilled through a Levene's *F* test, *F (100) = 3.403, p= .068.*

The results showed that there were no statistically significant differences between the two groups (*t* (100) = -1.452, *p* = .150). The scores for females (*M*= 2.045, *SD* = 1.210) and males (*M* = 2.427, *SD* = 2.427). The level of the variances in the means indicated that there was no statistical significance between the two groups. H1 was not supported, gender does not affect the educator's technology adoption in the classroom.

| | ***Gender*** | ***N*** | ***M*** | ***SD*** | ***SEM*** | ***t*** | ***df*** | ***p*** |
|---|---|---|---|---|---|---|---|---|
| Frequency | Female | 54 | 2.045 | 1.210 | .164 | -1.452 | 100 | .150 |
| | Male | 48 | 2.427 | 1.450 | .209 | | | |

**Table 4.9: An independent-samples t-test.**

**$H_5$:** Perceived usefulness will have a positive effect on educators' intention to adopt ICT.

Spearman correlation was utilised to assess the relationships between variables. This type of correlation was key in discovering the direction and strength of a monotonic relationship between two variables (Field, 2009). With the Spearman correlation normally distributed data is not a requirement and an assumption that as one variable goes up another variable goes down or vice versa can be made (Field, 2009). Therefore, the Spearman correlation was used since the assumptions of normality for the Pearson correlation were violated.

| | **Perceived Ease of Use** | **Intention to Use ICT** |
|---|---|---|
| Perceived Usefulness | - | |
| Intention to Use ICT | .522** | - |

**Table 4.10: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between perceived usefulness of ICT and the intention to use ICT by educators. The relationship was found to be moderately positive in strength and statistically significant (*r*= .522, *p <0.01).* This shows that as educators perceive ICT as usefulness their intention to adopt ICT in the classroom increases.

**$H_6$:** Perceived Ease of Use of ICT will have a positive effect on educators' intention to adopt ICT.

| | **Perceived Ease of Use** | **Intention to Use ICT** |
|---|---|---|
| Perceived Ease of Use | - | |
| Intention to Use ICT | .767** | - |

**Table 4.11: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between perceived ease of use of ICT and the intention to use ICT by educators. The relationship was found to be strongly positive in strength and statistically significant (*r*= .767, *p <0.01).* This shows that as educators perceive ICT as easy to use, their intention to adopt ICT in the classroom increases intensely.

**$H_8$:** Attitudes towards ICT adoption in the classroom will have a positive effect on educators' intention to adopt ICT.

| | Attitudes Towards ICT | Intention to Use ICT |
|---|---|---|
| Attitudes Towards ICT | - | |
| Intention to Use ICT | .071** | - |

**Table 4.12: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between the educators' attitudes towards ICT and the intention to use ICT. The relationship was found to be a weak positive correlation in strength and statistically significant ($r$= .071, $p$ <0.01). This shows that there is a relationship between the attitude of educators towards ICT and their intention to use it however, the relationship is not strong.

**$H_7$:** Social influence will have a positive effect on educators' intention to adopt ICT.

| | Social Influence | Intention to Use ICT |
|---|---|---|
| Social Influence | - | |
| Intention to Use ICT | .315** | - |

**Table 4.13: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between social influence and educators' intention of using ICT. The relationship was found to be a weak positive correlation in strength and statistically significant ($r$= .315, $p$ <0.01). This shows that there is a relationship between social influence and educators' intention of using ICT, however, the relationship is not strong.

**Objective 2:** To investigate factors that inhibit educators from adopting digital technologies in the classroom.

**$H_2$:** The school's location has an influence on educator adoption of technology.

| | *Gender* | *N* | *M* | *SD* | *SEM* | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|
| Competence | Urban | 34 | 4.795 | .426 | .1647 | 4.544 | 100 | .001 |
| | Township | 68 | 3.842 | 1.182 | .2093 | | | |

**Table 4.14: An independent-samples t-test.**
**denote that the corresponding variable is significant.

An independent t-test was conducted to compare the differences in educator's technology adoption in the classroom based on the school's location. The independent samples t-test was chosen in order to compare the means of the two groups (township and urban). The independent samples t-test is appropriate as it helps with determining whether the two-population means are significantly different (Field, 2009). Further to determine the suitability of the test, the data were assessed for normality and the distributions of data were sufficiently normal for allowing to conduct a t-test and the assumption of homogeneity of variances was tested and fulfilled through a Levene's *F* test, *F(100) = 21.998 p= .078.* An independent t-test was conducted to determine whether the school's location has an influence on educator adoption of technology. There was a statistically significant difference between schools in urban areas and townships (*t* (100) = 4.544, *p* = .001). Looking at the scores for urban (*M* = 4.795, *SD* = .426) and township (*M* = 3.842, *SD* = 1.182). The level of the variances in the means indicated a statistical significance between the two groups. Thus, educators in urban schools tend to be competent and use more ICT in the classroom compared to educators in township schools.

**$H_9$:** Barriers and technology support will have a positive effect on educators' intention to adopt ICT.

| | **Barriers and Support** | **Intention to Use ICT** |
|---|---|---|
| Barriers and Support | - | |
| Intention to Use ICT | -.118** | - |

**Table 4.15: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between barriers and technology support and educators' intention of using ICT. The relationship was found to be a weak negative correlation in strength and statistically significant (*r*= -.118, *p <0.01).* This shows that there is a relationship between the barriers and educators' intention of using ICT.

**Objective 3:** To determine whether ICT competence affects how educators implement digital technologies in the classroom.

**$H_3$:** The number of years teaching affects educator's implementation of digital technologies in the classroom.

| | **Frequency use of ICT** | **Number of Years Teaching** |
|---|---|---|
| Frequency use of ICT | - | |
| Number of Years Teaching | -.478** | - |

**Table 4.16: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

A Spearman correlation was utilised to examine the relationship between the numbers of years teaching and frequency of ICT use in the classroom by educators. The relationship was found to be moderately negative in strength and statistically significant (*r*= -.478, *p <0.01).* This shows that as the number of years teaching increases the level of frequency use of ICT in the classroom by educators decreases.

**$H_{10}$:** ICT Competence support will have a positive effect on educators' intention to adopt ICT.

| | **ICT Competence** | **Intention to Use ICT** |
|---|---|---|
| ICT Competence | - | |
| Intention to Use ICT | .756** | - |

**Table 4.17: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between ICT competence and educators' intention of using ICT. The relationship was found to be a strong positive correlation in strength and statistically significant (*r*= .756, *p <0.01).* This shows that there is a strong relationship between ICT competence and educators' intention of using ICT.

**Objective 4:** To investigate the level of ICT usage in educators.

**$H_4$:** Age of an educator influences' educators' adoption of ICT in the classroom.

Spearman correlation is utilised to assess the relationships between variables. This type of correlation is key to discovering the direction and strength of a monotonic relationship between two variables (Field, 2009). With the Spearman correlation, you don't need to have normally distributed data and even though you assume that as one variable goes up another variable goes up or the other variable goes down (Field, 2009). Therefore, the Spearman correlation was used since the assumptions of normality for the Pearson correlation were violated. In this case, the use of a Spearman correlation was to evaluate whether the age of an educator influences' educators' adoption of ICT in the classroom.

| | **Frequency use of ICT** | **Age of an Educator** |
|---|---|---|
| Frequency use of ICT | - | |
| Age of an Educator | .517** | - |

**Table 4.18: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

A Spearman correlation was utilised to examine the relationship between the educator's age and frequency of ICT use in the classroom. The relationship was found to be moderately positive in strength and statistically significant (*r*= .517, *p <0.01).* This shows that there is a positive relationship between the age of the educators and the level of frequency use of ICT in the classroom.

**$H_{11}$:** Level of Frequency and Access to ICT will have a positive effect on educators' intention to adopt ICT.

| | **Frequency and Access** | **Intention to Use ICT** |
|---|---|---|
| Frequency and Access | - | |
| Intention to Use ICT | -.720** | - |

**Table 4.19: Correlation between variables of interest.**
**denote that the corresponding variable is significant.

Spearman correlation was used to evaluate whether there is a relationship between frequency and access to the intention of using ICT by educators. The relationship was found to be a strong negative correlation in strength and statistically significant (*r*= -.720, *p <0.01).* This shows that there is a strong negative relationship between frequency and access of ICT and educators' intention of using ICT.

## 4.5 Summary of the results

This chapter offered an outline of the results of the research study. The chapter comprised the demographics of research respondents, the validity & reliability of the questionnaire items, descriptive statistics, an independent sample t-test and, to end, the correlation analysis. The demographics showed that there were more female respondents when compared to males. Females were at 52.9% and males at were 47.1%. Of the 104 educators who responded to the survey, 10.6% were under the age of 25, 46.2% were between the ages of 26-35 years old, 16.3% were between 36-45, 21.2% were between 46-55 and 5.8% were 56 years and older. The mean educator age was 37 years. The locations of the schools were 34.6% based in urban areas and 65.4% were in townships.

### 4.5.1 Summary of Hypothesis outcomes

| Hypothesis | Outcomes |
|---|---|
| **$H_1$:** Educators' gender positively affects the educator's technology adoption in the classroom. | Evidence was found to not be in support of Hypothesis 1, showing that gender does not influence educator's adoption of ICT in the classroom. There was no statistical difference between females and males. |
| **$H_2$:** The school's location has an influence on educator adoption of technology. | The results for Hypothesis 2 indicated that evidence was found to support the hypothesis. The school's location had an influence on the educator adoption of technology. Educators in urban schools had a higher adoption of technology in the classroom compared to those in the township schools. An independent t-test showed that there was a statistically significant difference between schools in urban and township areas. |
| **$H_3$:** The number of years teaching affects educator's implementation of digital technologies in the classroom. | Hypothesis 3 intended on determining whether the number of years teaching affects educator's implementation of digital technologies in the classroom. The results found that the relationship was a moderately negative relationship between number of years teaching and technology adoption. It indicated that as the numbers of years teaching increase, the level of frequency use of ICT in the classroom by educators decreases. |

| | |
|---|---|
| **$H_4$:** Age of an educator influences' educators' adoption of ICT in the classroom. | Hypothesis 4 intention was to ascertain whether age of an educator influences the adoption of ICT in the classroom. The relationship was found to be moderately positive in strength and statistically significant. With the younger educators having a higher adoption of technology in the classroom when compared to older educators. |
| **$H_5$:** Perceived usefulness will have a positive effect on educators' intention to adopt ICT. | Evidence was found to be in support of Hypothesis 5, showing that perceived usefulness does influence educator's intention of adopting ICT in the classroom. There was a positive correlation between perceived usefulness and intention to adopt ICT. |
| **$H_6$:** Perceived Ease of Use of ICT will have a positive effect on educators' intention to adopt ICT. | Evidence was found to be in support of Hypothesis 6, showing that perceived ease of use does influence educator's intention of adopting ICT in the classroom. There was a positive correlation between perceived ease of use and intention to adopt ICT. |
| **$H_7$:** Social influence will have a | Evidence was found to be in support |

| | |
|---|---|
| positive effect on educators' intention to adopt ICT. | of Hypothesis 7, showing that social influence does influence educator's intention of adopting ICT in the classroom, however the relationship was found not strong. |
| **$H_8$:** Attitudes towards ICT adoption in the classroom will have a positive effect on educators' intention to adopt ICT. | Evidence was found to be in support of Hypothesis 8. Showing a weak positive correlation in strength and indicating that there is a relationship between attitude of educators towards ICT and their intention to use it. |
| **$H_9$:** Barriers and technology support will have a positive effect on educators' intention to adopt ICT. | Evidence was found not to be in support of Hypothesis 9, showing a negative weak correlation in strength between barriers and technology support and educators' intention of using ICT. |
| **$H_{10}$:** ICT Competence support will have a positive effect on educators' intention to adopt ICT. | Evidence was found to be in support of Hypothesis 10. Showing a strong positive correlation between ICT competence and educators' intention of using ICT. |
| **$H_{11}$:** Level of Frequency and Access to ICT will have a positive effect on educators' intention to adopt ICT. | Evidence was found not to be in support of Hypothesis 11, showing a negative strong correlation in strength between level of frequency and access and educators' intention of |

adopting ICT.

**Table 4.20: A summary of the hypothesis and their outcomes.**

# CHAPTER 5. DISCUSSION OF THE RESULTS

## 5.1 Introduction

The purpose of this chapter was to confer the outcomes of the data analysis presented in the preceding chapter. The discussion contrasted the discoveries of this research study with the theoretical foundations depicted from prior literature as deliberated in Chapter two. Results chapter covered the findings on each hypothesis.

## 5.2 Discussion pertaining to Objective 1.

Evidence was found not in support of Hypothesis 1, showing that gender does not influence educator's adoption of ICT in the classroom. There was no statistical difference between females and male. Looking at the scores for females ($M$ = 2.045, $SD$ = 1.210) and males ($M$ = 2.427, $SD$ = 2.427). The level of the variances in the means indicated that there was no statistical significance between the two groups. H1 was not supported, gender does not affect the educator's technology adoption in the classroom. The outcomes of this research study illustrated that although there were no significant differences between males and females in terms of ICT adoption, the study did not look at disparities between these two groups in their attitudes and usage patterns of ICT.

Literature indicates that, there are mixed results that verify and contest that there are significant differences between females and males in their adoption of technology but what most studies fail to investigate is the differences that might exist in digital competences, attitudes, and usage patterns between these two groups (Vázquez-Cano, Meneses, & García-Garzón, 2017). This will ensure that researchers get a better understanding of who has more confidence in using technology between these two groups. This activity of looking beyond

purely looking at gender equality in ICT usage as equal numbers of males and females utilising technology is important as it gives other meaning to ICT usage, such as who is using it meaningfully, productively, and purposefully (Vázquez-Cano et al., 2017).

Furthermore, social structures have played a role in gender differences when it comes to technology adoption. This notion is based on societies where females are not given the same educational opportunities as their male counterparts (Varnhagen, 2002). In these societies males are encouraged to seek out computer learning opportunities and given access to training opportunities and computers. These disparities in technology access opportunities create a barrier for females to fully access and utilise technology (Varnhagen, 2002). Zhou and Xu (2007) looked at contextual factors when it comes to technology adoption. They found that females tend to be less aggressive when it comes to learning and utilising technology when compared to their male counterparts who are aggressive in learning technology and using it (Zhou & Xu, 2007). This gender contrast in technology socialization contributes to the differences in technology adoption between females and males. Even so, there is other research that argues against this notion of gender differences in technology adoption (Davison & Argyriou ,2016; Li & Glass, 2008).

According to Davison and Argyriou (2016), their results in their study indicated that the only difference between males and females' technology utilisation was on their technology preferences and used devices. They found that utilisation of technology in both men and females was generally at a similar degree. This is congruent with Li and Glass (2008) research study that asserted a similar trend in their work, they discovered that females and males have similar technology adoption rates and the disparity of technology usage between these two groups was found to be nonexistence. This is in accord with the outcomes of Hypothesis 1, the results showed that gender does not influence educator's adoption of ICT in the classroom. There was no statistical difference between females and males.

Hypothesis 5 was concerned with determining whether perceived usefulness had a positive effect on educator's intention of adopting ICT in the classroom. A correlation analysis was conducted, and results showed a moderately positive relationship in strength and statistically significant (*r*= .522, *p <0.01).* Indicating that when educators perceive ICT as usefulness their intention to adopt ICT in the classroom increases. Perceived usefulness can be interpreted as the educator's belief that using ICT in the classroom will bring improvement, require minimal effort, and can be easily integrated into the learning and teaching process without any difficulties (Luik, Piret, & Taimalu, 2021). Concerning perceived usefulness, many studies have been conducted to see its influence on educators' intention of adopting ICT. The common model across literature is the UTAUT model elaborated by (Venkatesh et al, 2003) which states that technology is only accepted when individuals deem it as useful and will assist them in doing the task at hand easily.

The results of this study showed that educators' highly rate perceived usefulness as a key determinant in adopting ICT in the classroom. The educators scored high on this item (*M = 4.37, SD = .894*). Furthermore, other researchers found perceived usefulness was a leading variable in determining the use of the digital technology by the lecturers at the University of Ibadan (Luik, Piret, & Taimalu, 2021). The study looked at how the lecturers see the digital library and its usefulness in providing real-time information, improving teaching, and learning process. Furthermore, they checked the effort it requires to utilise the system and the yielded results (cost and benefit). The results of the study showed lecturers were willing to accept the use of technology in their teaching only if it was useful and easily integrated into their current systems. This supports the statement by (Venkatesh et al., 2003) that technology is accepted when individuals deem it as useful.

Hypothesis 6 was concerned with determining whether perceived ease of use had a positive effect on educator's intention of adopting ICT in the classroom. Spearman correlation was used to evaluate whether there is a relationship between perceived ease of use of ICT and the intention to use ICT by educators. The relationship was found to be strongly positive in strength and statistically significant (*r*= .767, *p <0.01).* This shows that as educators perceive ICT as easy

to use, their intention to adopt ICT in the classroom increases intensely.

Perceived ease of use is viewed as the degree of how easy it is to use a technological system (Venkatesh et al., 2003). It is characterized by physical and mental efforts exerted in using a particular information technology (Buabeng, 2012). This ease of use determines the adoption rate of technology by individuals. According to Venkatesh et al., (2003) accessible and intelligible technology is straightforwardly accepted and adopted by all age groups. Ghalandari (2012) found that perceived ease of use (effort expectancy) was a determining factor among health care workers in adopting technology at the workplace. Another study found that the adoption of ICT was positively linked to perceived ease of use by the users of the technology (Eze, Ude, Uzochukwu & Kesharwani, 2021). In their study, they analysed primary school educators' behavioural intentions concerning the use of technology in the classroom. Results showed that educators only accepted technology if they perceived it as easy to use and requiring minimal effort (Eze et al., 2021).

Hypothesis 7 was concerned with determining whether social influence had a positive effect on educator's intention of adopting it in the classroom. A correlation analysis was conducted, and results showed a weak positive correlation in strength and statistically significant ($r$= .315, $p$ <0.01). Indicating that there is a relationship between social influence and educators' intention of using ICT however, in this case the relationship is not strong. The results showed a relationship that is weak, and this weakness could be attributed to different reasons that impact on educators' intention of adopting ICT in the classroom. Some of these reasons could be educators being in environments where technology adoption is not embraced, lack of access to technology, lack of leadership support and no collective buy in in from other educators in the same school.

A study conducted by Lee (2009) states that social support is multidirectional and complex. Social support needs to be analysed within a particular context and whether that context is supportive or dismissive (Lee, 2009). According to Lee (2009) users of technology may have big intentions of using a particular system however if the environmental factors are not encouraging, individuals will tend to

be hesitant in adopting the technology. Social factor is generally influenced by reassurance, praise, and support from others in the use of a new technology (Venkatesh et al., 2003) Therefore, all these factors play a crucial role in determining the likelihood of individuals adoption a technology. According to Giesing (2003) an individual may be driven to a certain behaviour (technology adoption) even if they do not favour it but since it is demonstrated by their superiors or peers they usually comply. Suggesting that individuals are inclined to base their decision making on other people's submissions.

Hypothesis 8 was concerned with determining whether attitudes had a positive effect on educator's intention of adopting it in the classroom. A correlation analysis was conducted, and results showed a weak positive correlation in strength and statistically significant (*r= .071, p <0.01).* This shows that there is a relationship between the attitude of educators towards ICT and their intention to use it however, the relationship is not strong. According to Demirci (2009) educators are the implementors of technology in the classroom, and to successfully institute and execute ICT technologies, educator's attitudes towards technology are vital. This notion is supported by statement by Keengwe and Onchwari (2008) that when educators discern technology as not adding value and fulfilling their classroom and learners' needs, it is most plausible that they will not accept the technology. As a result, educators' attitudes and beliefs toward technology are important and need to be considered a contributing factor toward educator adoption of technology in the classroom.

## 5.3 Discussion pertaining to objective 2.

The school's location has an influence on educators' adoption of technology. An independent t-test was conducted to determine whether the school's location has an influence on educator adoption of technology. There was a statistically significant difference between schools in urban areas and township ($t$ (100) = 4.544, $p$ = .001). Looking at the scores for urban ($M$ = 4.795, $SD$ = .426) and township ($M$ = 3.842, $SD$ = 1.182). The level of the variances in the means indicated that there was a statistical significance between the two groups. Thus, indicating that educators in urban schools tend to be more competent and use

more ICT in the classroom when compared to educators in the township schools.

The schools in the townships and rural areas of South Africa face numerous infrastructure challenges which include poor classroom infrastructure, unstable electricity, lack of educator development, high dropout rates, lack of learning materials and insufficient computers (Adukaite, Van Zyl, Er & Cantoni, 2017). The Department of Basic Education says it is a laborious process setting up ICT infrastructures in rural areas because of the location of rural schools, limited-service delivery, hard to reach schools and poor infrastructure (Department of Basic Education, 2017, p. 18).

Furthermore, educators teaching in township schools have cited issues such as overcrowded classrooms and lack of infrastructure as a major barrier in technology adoption (Dornisch, 2013). This challenge of having too many learners in the classroom results in struggles for educators to teach effectively, difficulty maintaining discipline and lack of enough resources for every learner in the classroom (Dornisch, 2013). Further to the overcrowded classroom is that educators do not receive the necessary professional development to deal with overcrowded classrooms, keep up with technological trends and stay up to date with new pedagogical approaches (Yildirim ,2007). This is contrary to the experience of educators in schools located in urban areas. The contrast between schools in urban and township areas in South Africa is big with urban schools having more resources and offering better educational outcomes when compared to schools in the townships (Yildirim ,2007).

Cawthera (2001) also identified the difficulty in reaching rural schools, lack of reliable electricity supply, no telecommunication infrastructure, and inability of school leaders in introducing ICT into the schools in rural and township areas. Furthermore, the schools in rural areas face the challenge of insufficient competent ICT personnel needed to offer technical support (Cawthera, 2001). This lack of ICT infrastructure in rural areas contributes to the discrepancy in ICT access between rural and urban schools.

Effective adoption of ICT into the schooling system in South Africa requires that both educators from township and urban schools gain access to ICT resources

and infrastructure since availability of infrastructure is a necessary determinant to the effective adoption and integration of ICT in the classroom (Plomp, Anderson, Law & Quale, 2009). Successful ICT integration in the classroom and teaching largely depends on the availability and readiness of ICT infrastructures such as the internet, hardware, and software (Bejrajh, 2022). Therefore, to have effective adoption of ICT, the infrastructure to ensure its success must be available and easily accessible to all schools and educators.

The literature stated above is congruent with the outcomes from Hypothesis 2. The school's location has an influence on educators' adoption of technology. In essence, if educators do not have access to ICT infrastructure, they cannot utilize it. Therefore, accessibility to software, hardware, computers, and the internet in both urban and township schools in South Africa is key to educators' effective adoption of technology. ICT is important and considered empowering for educators and learners as it allows them to easily access information, teaching content, improve ways of teaching and learning and ensure schools are keeping up with the digital trends in education (Kopcha, 2012). Therefore, it is important to ensure that all schools in South Africa have equal access to ICT (Kopcha, 2012).

Hypothesis 9 was concerned with determining whether barriers and technology support had a positive effect on educator's intention of adopting ICT in the classroom. A correlation analysis was conducted, and results showed a a weak negative correlation in strength and statistically significant ($r$= -.118, $p$ <0.01). This shows that there is a negative relationship between the barriers and educators' intention of using ICT. This negative correlation is indicative of the results shown in Chapter 4 whereby descriptive statistics revealed that even though educators have a positive attitude toward the use of technology in the classroom, however, there are barriers that inhibit educators from utilising ICT. This is an indication that without dealing with ICT barriers, the meaningful implementation of ICT in the classroom cannot be fully realised. Most educators indicated that the useful implementation of ICT was challenging mostly due to the absence of educational infrastructure, support, and resources.

Yildirim (2007) research study revealed that the lack of educator training, access to ICT infrastructure and lack of good ICT policies were big barriers to integrating

ICT in the classroom. The research further stated that educator training was difficult to implement as educators lacked supportive leadership, a restrictive education system, lack of motivation to learn about ICT, leading to resistance to adopting ICT in the classroom (Yildirim, 2007). Similarly, a study conducted in Cape Town, South Africa, revealed that insufficient training was a leading barrier to educators' ICT adoption. The research study further stated that even for those who received initial training in ICT, it was not enough as there was no follow-up training, insufficient technology resources, and a lack of leadership support to continue using ICT (Chigona & Chigona, 2010). Therefore, the intention of educators to adopt ICT in the classroom will not yield any positive results as long as the barriers that discourage educators from adopting the technology are not removed.

## 5.4 Discussion pertaining to Objective 3.

Hypothesis 3 was concerned with determining whether the number of years teaching affects the educator's inclination to use digital technologies in the classroom. The relationship between the number of years teaching and digital technology adoption by educators was found to be moderately negative in strength and statistically significant ($r$= -.478, $p$ <0.01). This shows that as the numbers of years teaching increase, the level of frequency use of ICT in the classroom by educators decreases.

This indicates that despite the increase in access to digital technologies in schools and classrooms, educators who have been teaching for a long time usually are hesitant users of digital technology. These educators are used to the dated standards of teaching and when it comes to shifting to new ways of teaching there is reluctance (Mac Callum, Jeffrey, & Kinshuk, 2014). When compared to younger educators, older educators who are hesitant in adopting digital technologies observed integration of technology undesirable because of low self-efficacy, lack of training, holding on to old ways of teaching and being uncomfortable with using technology (Mac Callum et al., 2014).

Similarly, educators with few years teaching were more prone to integrating digital technologies in their teaching methods than educators with more year's teaching

experience (Lau & Sim, 2008). The report stated that educators with 3 years' experience in teaching registered using 48% of their time using any form of digital technology, educators with 4-9 years' experience in teaching spent 45% and those with 10-20 years were found to be utilising 33% of their time on digital technologies (Lau & Sim, 2008). The rational for this disproportion is that younger educators may be more experienced in using technology (Lau & Sim, 2008).

Hypothesis 10 was concerned with determining whether ICT competence had a positive effect on educator's intention of adopting it in the classroom. A correlation analysis was conducted, and results showed a weak positive correlation in strength and statistically significant ($r$= .756, $p$ <0.01). This shows that there is a strong relationship between ICT competence and educators' intention of using ICT.

ICT competence is an important ingredient in ensuring ICT adoption in schools by educators. It can be defined as one believing in their capabilities to act necessary to attain a certain goal (Baubeng, 2012). Several research studies have mentioned ICT competence to have an effect and influence on the educator's utilization of ICT. Yuen and Ma (2008) research study on Hong Kong educators revealed that ICT integration was determined by perceived educator belief and their experience in using computers. Therefore, educator computer self-efficacy is an important factor to study as it influences educator judgment on their abilities to use ICT.

There is also a significant correlation between educators' use of technology in the classroom and their competence (Harrell & Bynum, 2018). According to Li et al., (2015) there is a positive correlation between the educator's use of ICT in the classroom and their self-efficacy. Their study determined that the educator's self-efficacy influences student achievement and teaching practices (Li et al., 2015). Therefore, ICT competence is vital and a key ingredient in implementing ICT in the classroom by educators.

## 5.5 Discussion pertaining to Objective 4

Hypothesis 4 looked at whether the age of an educator influences the educators' adoption of ICT in the classroom. The results indicated that there is a positive

relationship between the age of the educators and the level of frequency use of ICT in the classroom. The results clearly indicate that educators between the ages of 26-35, mostly, access ICT daily. Educators between the ages of 55 and above tend to use less of ICT when compared to educators that are younger. This existing variance between younger and older educators need to be addressed. This variance between these two groups can be attributed to different factors but one of the strong contributors is the lack of ICT competence and professional development.

Educators' professional development is one of the crucial factors that contribute to positive integration of ICT in the classroom. A study revealed that professional development in ICT is crucial for older educators to become comfortable and confident in using ICT for teaching (Chigona & Chigona, 2010). Whether the educator is a beginner or experienced in ICT, professional development training programs can develop the educators' competences in using a computer (Chigona & Chigona, 2010). Moreover, educator training in ICT will ultimately increase their competence in ICT thus increasing the chances of an effective integration and adoption of ICT in the classroom.

A review of technology acceptance theory was conducted by Venkatesh et al., (2003) shows that the behaviour of users is assessed not only through subjective means such as an individual's behavioural intention but also on the external variables and their influence on technology use intention (Ajibade, 2018). UTAUT brings forward the determinants and factors of intention to use technology and behaviour change over time (Venkatesh et al., 2003). The model is anchored on three direct causal factors of intention to use technology (social influence, effort expectancy and performance expectancy) and two direct causal factors of usage behaviour (facilitating conditions and intention). According to Venkatesh et al., (2003) these associations are mediated by experience, voluntariness, age, and gender. Looking Hypothesis 4, where the focus was on the educator's age influence on technology adoption. Looking at the outcomes from Hypothesis 4, age does have an influence on the adoption of technology. Venkatesh et al., (2003) asserted that the intention to use technology and its perceived usefulness differs with age, with more young individuals showing a stronger intention to use and adopt technology (Venkatesh et al., 2003).

Furthermore, age has been linked to ICT competence as the educator's age impacts the ICT level the educators engage within the classroom (Eynon, 2009). Research conducted in Australia established a generational gap in ICT use; as the age of an individual increases, the less likely to use ICT. As the individuals' age increases, the frequency of online activity decreases greatly (Australia Communication and Media Authority, 2011). Similarly, a research study conducted in South Africa found that demographics such as age, level of education and language influenced ICT use (Blignaut, 2009). The research asserted that young people and people who form part of the prime workforce (age 25-40) are rated among high computer and internet users (Blignaut, 2009).

Blignaut (2009) found that learners are more ICT competent when compared to educators. As the educator's age increases, their ICT competence decreases. Furthermore, learners are also cited to be more excited about integrating ICT into the classroom than educators (Blignaut, 2009). This emphasizes the importance of educator training and support to assist close the gap. Therefore, it is important to ensure that these technology trends do not leave behind educators.

The literature stated above is congruent with the outcomes from Hypothesis 4, which stated that older educators tend to use less technology and are more reluctant in adopting technology in the classroom. This analysis of age differences in ICT adoption by educators is not conclusive, however, it is critical to understand that these disparities in ICT access within educator age groups exists. This is to ensure that educator development programmes are tailor made to each educator’s needs and ICT experience (Lau & Sim, 2008).

Hypothesis 11 was concerned with determining whether the level of frequency and access to ICT had a positive effect on educator’s intention of adopting ICT in the classroom. A correlation analysis was conducted, and results showed a strong negative correlation in strength and statistically significant ($r = -.720$, $p < 0.01$). This shows that there is a strong relationship between frequency and access of ICT and educators’ intention of using ICT. This negative correlation is indicative of the results shown in Chapter 4 whereby descriptive statistics revealed that most educators do not have full access to a computer at school or

home. Although their intention of wanting to use ICT in their schools was high but due to the lack of access and technological infrastructure their frequency and access to ICT was low. The mean frequency and access level to ICT was (*M: 2.21, SD =1.334).* Educators mean score indicated that most educators on the research study access ICT twice a week and once a week. Some of the items that educators scored low on were 'I do have access to a computer at home, and I use it frequently' (*M : 2.08, SD* =1.532*),* 'I surf the internet frequently at home using a computer or my mobile phone' (*M : 1.89, SD*=1.455*),* ' I use my computer for work' (*M : 2.36, SD* =1.586*),* and 'I use my mobile phone for work' (*M : 1.80, SD* =1.354*).*

Educators' accessibility to ICT resources and infrastructure is a necessary determinant of the effective adoption and integration of ICT in the classroom (Plomp, Anderson, Law & Quale, 2009). Successful ICT integration in the classroom and teaching largely depends on the availability and readiness of ICT infrastructures such as the internet, hardware, and software (Plomp, Anderson, Law & Quale, 2009). In essence, if educators do not have access to ICT infrastructure, they cannot utilize it. Therefore, accessibility to software, hardware, computers, and the internet is key to educators' effective adoption of technology.

## 5.6 Discussion of results in relation to the theoretical framework

The following section discussed the findings using the theoretical framework presented in chapter 2.

### 5.6.1 Theoretical Framework Discussion

The outcomes from Hypothesis 1 showed that the evidence was found not in support of Hypothesis 1, showing that gender does not influence educators' adoption of ICT in the classroom. The role of gender in technology adoption rate has been a subject of numerous studies but there has not been any conclusive evidence detailing the differences between males and females' adoption rates of technology Venkatesh et al., (2003). There is also not a lot of research work utilising the UTAUT model and fully considering the influence of gender in

technology adoption. Literature indicates that, there are mixed results that verify and contest that there are significant differences between females and males in their adoption of technology but what most studies fail to investigate is the differences that might exist in digital competences, attitudes, and usage patterns between these two groups (Vázquez-Cano, Meneses, & García- Garzón, 2017).

The UTAUT model is anchored on three direct causal factors of intention to use technology (social influence, effort expectancy and performance expectancy) and two direct causal factors of usage behaviour (facilitating conditions and intention) (Venkatesh et al., 2003). In this study, this was found to be true, Hypothesis 5 (perceived usefulness), Hypothesis 6 (perceived ease of use) and Hypothesis 7 (social influence) were found to have a positive influence on the adoption of ICT in the classroom. These factors were highly correlated with the intention of educator's adoption of ICT. Literature supports this statement as Venkatesh et al., (2003) found in their model that these three factors are important precursors of technology adoption. Moreover, these have also received heuristic empirical support from other studies (Al-Smadi, 2012, Shin & Kim ,2008) that confirmed that in the context of technology acceptance and adoption, perceived ease of use, perceived usefulness and social support are crucial determinants.

Furthermore, the UTAUT model asserts that these associations are mediated by experience, voluntariness, age, and gender. However, in this research study, gender was found to be an insignificant contributor to technology adoption. This analysis of gender differences in ICT adoption by educators is not conclusive and more work is needed to investigate the differences that might exist in digital competences, attitudes, and usage patterns between males and females.

Looking at Hypothesis 3 and 4. The outcomes from these Hypothesises both indicate that the number of years teaching, and age of an educator influence educator's adoption of ICT in the classroom. These results are consistent with the theory by Venkatesh et al. (2003). The results indicated a positive relationship between the age of the educators and the level of frequency use of ICT in the classroom. The results clearly indicate that educators between the ages of 26-35, mostly, access ICT daily. Educators between the ages of 55 and above tend to use less ICT when compared to educators that are younger. Venkatesh et al.,

(2003) asserted that the intention to use technology and its perceived usefulness differs with age, with more young individuals showing a stronger intention to use and adopt technology (Venkatesh et al., 2003). This research study found that the older educators who have been teaching for many years tend to use less technology in the classroom and are less confident and comfortable with adopting technology in the classroom.

Furthermore, in the UTAUT theory Venkatesh et al., (2003) was able to identify the limitations of the model. The primary limitation was that the theory overlooked people's experiences, individual choices, environmental influences, and contextual factors (Venkatesh et al., 2003). Hence, this study planned on looking behavioural intention when it comes to ICT adoption. This research study looked at understanding how each educators' characteristics (age, experience), social factors (social influence) and external factors (support) influence them in the adoption of ICT in the classroom. Looking at Hypothesises 8,9,10 and 11, the research study was trying to discover how these may have an influence on educators' intention of adopting ICT in the classroom and inhibitors that discourage educators from adopting ICT. In Hypothesis 8, it was proven that attitudes towards ICT positively influence the intention to adopt it. Hypothesis 9 demonstrated that for educators to adopt ICT, structural barriers must be addressed and there must be adequate support to sustain the adoption of ICT. Hypothesis 10 showed that ICT competence is an important ingredient in ensuring ICT adoption in schools by educators. ICT competence means that educators are confident in their ICT knowledge and skills and this confidence translates to meaningful integration of ICT in the classroom. Hypothesis 11 showed that the intention to adopt ICT might be there but if resources such as accessibility to software, hardware, computers, and the internet are not present then frequency and access of ICT will be low.

## 5.7 Conclusion

This chapter discussed the results that were presented in chapter 4. The discussion compared the findings of this research with the theoretical foundations drawn from previous literature as discussed in Chapter 2. This chapter covered the outcomes of each hypothesis and discussed in detail the influences of

educator technology adoption. The following section covers the conclusion for each of the objectives of the study, recommendations, limitations of the study and the summary.

# CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Introduction

Chapters 1 and 2 posed the background of the research study, theoretical framework and rationalised the objectives of this research study. Chapter 3 described a framework that showed a plan and detailed structure that was utilised in the research study to collect and analyse information. Chapters 4 and 5 showcased the results and analysis of the collected data.

The concluding chapter observed the inferences of the research study with the positioning of the background displayed at the beginning, limitations of the study, recommendations, and propositions for potential future research studies were presented.

## 6.2 Conclusion

The conclusion was informed by each research objective of this study. The following objectives were investigated:

### 6.2.1 To investigate factors contributing to educator willingness to adopt digital technologies in the classroom.

This exponential rate of technology adoption in society has placed the obligation and duty on schools and educators to integrate technology into the classroom in order to ensure that schools and learners keep up with technological demands and development. This growing demand for technology in education is important to give learners an opportunity to access the jobs of the future. However, for this technology integration to be successful and effective, educators need to adopt these technologies into their classrooms. For a successful integration of technology into teaching, factors that affect educators in their adoption must be considered. These factors include attitudes towards technology, access to the

technology, age of an educator, perceived ease of use of the technology, intention to use it, technology support, perceived usefulness of the technology and social influence. All these factors play a role in determining whether an educator will integrate technology in their classroom.

### 6.2.2 To investigate factors that inhibit educators from adopting digital technologies in the classroom.

Subsequently, for the technology to be adopted in schools by educators, there must be availability of computers and internet in the school readily available to be utilised by educators and learners. This research study indicated that there is an existing variance in adoption patterns between younger and older educators and in schools located in urban and rural areas. Therefore, it is crucial for the Department of Education to focus interventions on these factors and ensure that support such as availability of ICT infrastructure, educator professional development, leadership support and technical support is available and accessible to all educators.

### 6.2.3 To determine whether ICT competence affects how educators implement digital technologies in the classroom.

ICT skills are crucial and a great determinant in the adoption of ICT in the classroom. When educators acquire competence in ICT it means they become confident and comfortable with using it to teach and facilitate the learning process in the classroom. However, the lack of ICT skills results in the unwillingness of educators to adopt technology thus creating barriers to the acceptance of technology. Thus, the importance of educator ICT training is key and can be used to combat the unwillingness of educators to adopt ICT in their classrooms. The absence of ICT competence is not only a barrier to the adoption of technology in the classroom by educators, but in essence it gives rise to resistance to change, when educators feel less confident using ICT, the chances of them resisting change are higher. Therefore, efforts need to be made in upskilling and training educators on ICT to mitigate the resistance in technology integration in the classrooms.

### 6.2.4 To investigate the level of ICT usage in educators.

The results from this research study indicated that younger educators tend to utilise more ICT in the classroom when compared to older educators. This shows that there is a link between age and ICT competence. The results indicate that as the educators age increases, their frequency in using ICT decreases. These results are in line with general literature that state that young people and people who form part of the prime workforce (age 25-40) are rated among high computer and internet users (Blignaut, 2009). Furthermore, learners are also cited to be more excited about integrating ICT into the classroom than educators. This emphasizes the importance of educator training and support to assist close the gap between younger and older educators when it comes to ICT integration in the classroom.

## 6.4 Recommendations

The educators suggested when answering the online questionnaire that ease of use of ICT was important in determining whether they adopt the technology. This result leads to a proposal to offer appropriate training for educators in order for them to feel more comfortable in using technology and find it easy to utilise. In addition, even though educators scored high on perceived usefulness of ICT, more work needs to be achieved to assist educators see value in using ICT in their classrooms, in particular older educators who are accustomed to using traditional methods in teaching and facilitating the learning process. Therefore, government representatives, technology leaders in education and school management should propose comprehensive ICT development courses that will equip educators of all kinds with necessary technology skills to assist them in implementing these technologies in the classroom.

This research study highlighted the discrepancy of technology adoption between younger, older educators, urban and rural schools. The results show that there existing gaps in technology adoption between these groups and to ensure there is effective implementation of technology in South African schools, these gaps must be dealt with. The onus is on all relevant stakeholders in education to devise strategies to implement professional development policies to assist educators

gain necessary skills to implement technology in the classroom. Moreover, technology leaders in education need to understand the leading causes behind the technology adoption gaps to understand fully the context before designing and implementation interventions.

Governments and relevant stakeholders' roles should be to strengthen and improve ICT skills and frameworks in South African schools. There should be a plan in place to inspire greater ICT utilisation in education. Furthermore, private sectors in the role of Telecommunications companies must create customised technology services for schools in South Africa and these services and packages must take into consideration the school's unique environment and needs. These tailored services need to be inexpensive, affordable, offer education-based solutions and be easy to utilise.

## 6.3 Suggestions for further research

The focus of this study was on factors that contribute to educator ICT adoption in the classroom. An alternative research study could look at technologies that are key to education and how educators perceive those technologies and the utilisation of them in the classroom. This study on education specific technologies could assist educators, policy makers and school management in deciding which technologies to adopt for their schools and which infrastructure is needed to support such a technology in their schools. Consequently, this research study could offer a foundation of invaluable information to technology service providers on what educators need in terms of general technology tools in teaching and learning in South Africa.

In this research paper, educators were sampled only from the Gauteng province in South Africa. To get a more representative and holistic view of the population amongst educators, researchers must sample a broader sample that is inclusive of other provinces in the country. This will ensure that researchers get an accurate representation of South African educators.

Teaching educators how to use technology in the classroom is not sufficient, educators need strategies on how to effectively infuse technology in the teaching

and learning environment. Therefore, a technological pedagogical approach must be devised to ensure effective implementation of technology. Instructing educators on how to use technology will not bear tangible results but educators must understand and be able to implement and employ technology to augment their teaching strategies. Therefore, further studies need to be conducted to look at pedagogical approaches that lead to effective implementation of ICT in schools in South Africa.

# REFERENCES

Ajibade, P. (2018). Technology acceptance model limitations and criticisms: *Exploring the practical applications and use in technology-related studies, mixed-method, and qualitative researches*. Library Philosophy & Practice, 1941.

Al-Shafi S.H., 2009, Factors affecting e-government implementation and adoption in the State of Qatar, West London: Brunel University.

*Alshmrany, S., & Wilkinson, B. (2017). Factors influencing the adoption of ICT by educators in primary schools in Saudi Arabia. International Journal of Advanced Computer Science and Applications, 8(12).*

Australian Communications and Media Authority. (2011). Digital Australians - expectations about media content in a converging media environment: qualitative and quantitative research report. Belconnen, Australia: Australian Communications and Media Authority. Retrieved from http://nla.gov.au/nla.arc- 141049.

Bejrajh, V. (2022). The use of information communication technology in the classroom to enhance teaching and learning at selected Secondary Schools in Limpopo Province (Doctoral dissertation).

Blignaut, P. (2009). A bilateral perspective on the digital divide in South Africa. *Perspectives on Global Development and Technology*, 8(4), 581- 601.

*Bhattacherjee*, A. (*2012*). *Social Science Research: Principles, Methods, and Practices*. Open University Press, USF Tampa Bay.

Buabeng, C. (2012). Factors influencing educator's adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using ICT*, 8(1).

Brata, A. H., & Amalia, F. (2018, June). Impact analysis of social influence factor on using free blogs as learning media for driving teaching motivational factor. In Proceedings of the 4th International Conference on Frontiers of Educational Technologies (pp. 29-33).

Cameron, S., & Price, D. (2009). *Business research methods: A practical approach*. London: Chartered Institute of Personnel Development.

Chen, C. H. (2008). Why do educators not practice what they believe regarding technology integration? *The Journal of Educational Research, vol. 102*, no.1, pp. 65-75.

Chigona, A., & Chigona, W. (2010). An investigation of factors affecting the use of ICT for teaching in the Western Cape schools.

Connolly, P. (2007). Quantitative data analysis in education*: A critical introduction using SPSS.* London & New York: NY: Routledge.

Creswell, J. W., & J. D. (2018)., *Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, California: SAGE Publications, Inc.

Cruz-Jesus, F., Vicente, M. R., Bacao, F., & Oliveira, T. (2016). The education-related digital divide: *An analysis for the EU-28. Computers in Human Behavior, 56*, 72-82.

Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology*. MIS Quart. 13 319–339.

Demirci, A. (2009). How do Teachers Approach New Technologies: Geography Teachers' Attitudes towards Geographic Information Systems (GIS). *European Journal of Educational Studies, vol. 1*, no.1.

Dlamini, R., & Mbatha, K. (2018). "The discourse on ICT teacher professional development needs: *The case of a South African teachers' union." International Journal of Education and Development using ICT 14*(2).

Dornisch, M. (2013). The digital divide in classrooms: Teacher technology comfort and evaluations *Computers in the Schools 30*(3): 210-228.

Drent, M., & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers & Education 51*(1): 187-199.

Dwolatzky, B., & Haarries, M. (2 July 2020). SA Education: A national reset is needed, and mass internet access is the only way forward.

Earle, R., S. (2002). The integration of instructional technology into public education: *Promises and challenges. ET Magazine, vol. 42*, no. 1, pp. 5-13.

Eze, Nicholas Ude, Peter Uzochukwu Obichukwu, and Subodh Kesharwani. "Perceived usefulness, perceived ease of use in ICT support and use for teachers." *IETE Journal of Education* 62.1 (2021): 12-20

Eynon, R. (2009). *The learner and their context: review of the evidence.* London, England: Becta.

Felix, A. A. (2021). *Integrating Geography teaching and learning using Information and Communication Technology* (Doctoral dissertation, University of the Free State).

Field, A. (2009). *Discovering Statistics Using SPSS*. 3rd Edition, Sage Publications Ltd., London.

Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology*, *4*(2), 38-57.

Govender, D., & Govender, I. (2009). The relationship between information and communication technology (ICT) integration and teachers' self efficacy beliefs about ICT. *Education as Change, 13(1):*153-165.

Gudmundsdottir, G. (2010). From digital divide to digital equity: Learners' ICT competence in four primary schools in Cape Town, South Africa. *International Journal of Education and Development Using ICT*, *6*(2), 84-105.

Gülbahar, Y. (2007). Technology planning: A roadmap to successful technology integration in schools. *Computers & Education, vol. 49*, no. 4, pp. 943- 956.

Gupta, K., & Lee, H. (2001). *A practical guide to needs assessment*. San Francisco, CA: Wiley.

Grant, C., Jasson, A. & Lawrence, G. (2010). Resilient KwaZulu-Natal schools: an ethics of care. Southern African Review of Education, 16(2), 81-99.

Habibu, T. (2012). *A Study of Difficulties Faced by Teachers in Using ICT in Classroom Teaching-Learning in Technical and Higher Educational Institutions in Uganda* (Doctoral dissertation, Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT)).

Hamzat, S. A., & Mabawonku, I. (2018). Influence of performance expectancy and facilitating conditions on use of digital library by engineering lecturers in universities in south-west, Nigeria. *Library philosophy and practice*, 1-16.

Hart, S. A., & Laher, S. (2015). Perceived usefulness and culture as predictors of teachers attitudes towards educational technology in South Africa.*South African Journal of Education 35*(4).

Harrell, S., & Bynum, Y. (2018). Factors affecting technology integration in the classroom. *Alabama Journal of Educational Leadership*, *5*, 12-18.

Hastings, T., A. (2009). *Factors that predict quality classroom technology use* (Doctoral dissertation, Bowling Green State University).

Harrell, S., & Bynum, Y. (2018). Factors affecting technology integration in the classroom. *Alabama Journal of Educational Leadership*, *5*, 12-18.

Herselman, M. E. (2003). ICT in rural areas in South Africa: various case studies. *Informing Science Proceedings*, 945-955.

Hickson, R. S. (2016). *The relationship between self-efficacy and teachers' ability to integrate technology*. Liberty University.

Howie, S. J., Muller, A., & Paterson, A. (2005). *Information and communication technologies in South African secondary schools*. HSRC Press.

Jones, C., A. (2001) Teach Support: Preparing teachers to use technology. *Principal Leadership, vol. 1, no. 9*, pp. 35-39.

Kerzic, D., Danko, M., Zorko, V., & Decman, M. (2021). The effect of age on higher education teachers' ICT use. *Knowledge Management & E-Learning: An International Journal*, *13*(2), 182-193.

Lan, L., Eric, A., Worch, B., Zhou, A. & Aguiton, R. (2015). How and Why Digital Generation Teachers Use Technology in the Classroom: An Explanatory Sequential Mixed Methods Study. Education: The International Journal for the Scholarship of Teaching and Learning.

Lei, J., & Zhao, Y. (2007). Technology uses and student achievement: A longitudinal study. *Computers & Education*, *49*(2), 284-296.

Leward, J., & Lazarus, Z. W. (2021). The economic impact of unemployment and inflation on output growth in South Africa. *Journal of Economics and International Finance*, *13*(3), 117-126.

Lin, H., F. (2007). Predicting consumer intentions to shop online: An empirical

test of competing theories. *Electronic Commerce Research and Applications, 6(4)*, 433-442.

Luan, W. S., & Teo, T. (2009). Investigating the technology acceptance among student teacher in Malaysia: An application of the technology acceptance model (TAM). *Asia-Pacific Education Researcher*, *18*(2), 261-272.

Mac Callum, K., & Jeffrey, L. (2014). Factors impacting teachers' adoption of mobile learning. Journal of Information Technology Education, 13.

Mathevula, M. D., & Uwizeyimana, D. E. (2014). The challenges facing the integration of ICT in teaching and learning activities in South African rural secondary schools. *Mediterranean Journal of Social Sciences*, *5*(20), 1087.

McKeever, M. (2017). Educational Inequality in Apartheid South Africa. *American Behavioral Scientist, 6*1(1), 114-131.

Mekawie, N. M. (2013). *Factors affecting adoption of eHealth in Egypt* (Doctoral dissertation, Middlesex University).

Mlambo, S., Rambe, P., & Schlebusch, L. (2020). Effects of Gauteng province's educators' ICT self-efficacy on their pedagogical use of ICTS in classrooms. *Heliyon*, *6*(4), e03730.

Obizoba, C. (2016). Effective facilitation methods for online teaching. *International Journal of Higher Education Management, 2*(2).

Olson, K. E., O'Brien, M. A., Rogers, W. A., & Charness, N. (2011). Diffusion of technology: frequency of use for younger and older adults. *Ageing international*, *36*(1), 123-145.

Onaolapo, S., & Oyewole, O. (2018). Performance expectancy, effort expectancy, and facilitating conditions as factors influencing smart phones use for mobile learning by postgraduate students of the University of Ibadan, Nigeria. *Interdisciplinary Journal of e-Skills and Lifelong Learning*, *14*(1), 95-115.

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (2009). Cross-national information and communication technology: policies and practices in education. Charlotte, N.C.: Information Age Publishing.

Raman, K., & Yamat, H. (2014). Barriers Teachers Face in Integrating ICT During English Lessons: A Case Study. *Malaysian Online journal of educational technology*, *2*(3), 11-19.

Rangaswamy, A., & Gupta, S. (2000). Innovation adoption and diffusion in the digital environment: some research opportunities. *New product diffusion models*, *2000*, 75-96.

Rathore, M. K., & Sonawat, R. E. E. T. A. (2015). Integration of technology in education and its impact on learning of students. *Internaltional Journal of Applied Home Science*, *2*(7-8), 235-246.

Samarawickrema, G., & Stacey, E. (2007). Web-based learning and teaching: *A case study in higher education Distance Education, vol. 28*, no. 3, pp. 313-333.

Saunders, M. N., Lewis, P., & Thornhill, A. (2009). *Understanding research philosophies and approaches*. Harlow: Pearson Education.

Sherry, L., & Gibson, D. (2002). The path to teacher leadership in educational technology*. Contemporary issues in technology and educator education, vol. 2*, no. 2, pp. 178-203.

South Africa's investment into Information and communication technology (ICT) in higher education and opportunities for external investment by Professor Hlengiwe Mkhize (MP) Deputy Minister of Higher Education and Training during the African Education Sum | South African Government. (2021).

Statistics South Africa. (2022). Statistics South Africa | The South Africa I Know, The Home I Understand. Statssa.gov.za. https://www.statssa.gov.za/.

Spaull, N., & Hoadley, U. (2018). "Getting reading right: Building firm foundations." Child Gauge: 201777.

Schleicher, A. (2020). The Impact of COVID-19 on Education: Insights from" Education at a Glance 2020". *OECD Publishing*.

Teo, T., & Zhou, M. (2014). Explaining the intention to use technology among

university students: A structural equation modeling approach. *Journal of Computing in Higher education*, *26*, 124-142.

Teo, T., & Noyes, J. (2011). Explaining the intention to use technology among university students: A structural equation modeling approach. Journal of Applied Social Psychology, 41(12), 2966-2990.

Triegaart, J. D. (2009). Poverty and inequality in South Africa: Policy considerations in an emerging democracy. *Indic. S. Afr*, *15*, 53-58.

van der Berg, S. (2011). "Low quality education as a poverty trap."

van Jaarsveld, L., & van der Walt, J. L. (2018). A critical look at a technologically sophisticated initiative to address the problem of unequal educational opportunities in South Africa. *Educational Research for Social Change, 7(2)*, 22-38.

Vázquez-Cano, E., Meneses, E. L., & García-Garzón, E. (2017). Differences in basic digital competences between male and female university students of Social Sciences in Spain. International Journal of Educational Technology in Higher Education, 14(1), 1-16.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal filed studies. *Management Science, 46*, 186–204.

Voogt, J., Knezek, G., Cox, M., Knezek, D., & Brummelhuis, A. (2013). Under which conditions does ICT have a positive effect on teaching and learning? A call to action. Journal of Computer Assisted Learning, 29(1), 4-14.

Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E., & Monseur, C. (2013). The Use of ICT in Education: a survey of schools in E urope. *European journal of education*, *48*(1), 11-27.

Wei, L. M., Piaw, C. Y., Kannan, S., & Moulod, S. A. (2016). Relationship between educator ICT competence and teacher acceptance and use of school management system (SMS). *Malaysian Online Journal of Educational Technology*, *4*(4), 36-52.

Weinberg, A. (2010). *Elementary students' perceptions of classroom technology*. ProQuest Central; ProQuest Dissertations & Theses Global.

Yilmaz, N.P. (2011). Evaluation of the Technology Integration Process in the Turkish Education System. *Contemporary Educational Technology, vol.2*, no.1, pp. 37-54.

Yuen, A. H. K., & Ma, W. W. K. (2008). Exploring teacher acceptance of E-learning technology. *Asia-Pacific Journal of Teacher Education, vol. 36*, no. 3, pp. 229-243.

Zewotir, T., & North, D. (2011). Opportunities and challenges for statistics education in South Africa. *Pythagoras*, *32*(2), 1-5.

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2013*). Business Research Methods*

.Ohio: Southern-Western Cengage Learning.

Zhou, G., & Xu, J. (2007). Adoption of Educational Technology: How Does Gender Matter?. *International Journal of Teaching and learning in higher education*, *19*(2), 140-153.

# Appendix A

Dear Research Respondent

My name is Mlungisi Zuma, and I am a master's student at the University of the Witwatersrand in the field of Digital Business. As part of my master's degree requirements, I must undertake a research study. My study is investigating the adoption of digital technologies by public high school educators in Gauteng.

This research study seeks to find out factors that contribute to educator adoption of digital technologies in the classroom. The digital technologies referred to in this study are Information and Communication Technologies (ICT). These include; a computer, a tablet, interactive whiteboard, email, instructional software and distance learning programs. Therefore, I wish to invite you to participate by answering questions in this questionnaire.

My supervisor is Ayanda Magida. She will be guiding me throughout the research study process.

The Ethics in Research Committee in the Faculty of Commerce, Law, and Management has ensured that this questionnaire conforms to the University's highest ethical standards. This means that:

- There are no identified risks or dangers linked with taking part in this study.
- Participation is voluntary, as a respondent, you have the right to leave from the study at any time.
- Your information collected in this questionnaire will remain strictly confidential and anonymous.
- Please note that writing your name on the questionnaire is not required and your answers will be treated as anonymous.

The questionnaire consists of 8 sections and to fill it in; please allow for 40 minutes to complete it.

Thank you sincerely for taking part in my research study and please note this research study will be available through the Wits online library.

For any questions relating to this research study please contact me on
1058590@students.wits.ac.za

Yours sincerely,
Mlungisi Zuma

# Appendix B

### Section 1: Demographics

Instructions: Please fill it in as truthfully as you can.

1. As a participant, I am willingly accepting to partake in this research study. I acknowledge that my participation is voluntary and anonymous. I am over the age of 18 and consent to the study.
2. 
   - Yes
   - No

3. Gender
   - Female
   - Male
   - Prefer not to say.

4. Age
   *Please fill in*….

5. Number of Years Teaching
   *Please fill in*….

6. Years of Teaching with using technology (computer, whiteboard, etc.)
   *Please fill in*….

7. School location
   -Urban
   -Township

8. Highest completed academic certification.
   *Please fill in*….

9. During your time as an educator, have you taken any training workshops, courses, on using a computer for teaching in the classroom?

   *If "Yes", please indicate the number of hours or days….*

### Section 2: Survey

Instructions: Please rate your ICT knowledge, accessibility, usage, support, and challenges.

1. 

| Perceived Usefulness | Item | Strongly Disagree | Disagree | Neutral | Agree | Strong Agree |
|---|---|---|---|---|---|---|
| 1 | Computers are going to make teaching better and easier. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | Using technology and computers in the classroom makes school subjects interesting. | | | | | |
| 3 | Using computers and technology in teaching is better than current traditional methods. | | | | | |
| 4 | The availability of computers must be regarded as high priority for educators. | | | | | |
| 5 | Using computers for teaching my learners will make my work better. | | | | | |
| 6 | I will be more productive in my work with the assistance of a computer. | | | | | |
| 7 | Computers are a useful tool. | | | | | |

2.

| **Perceived ease of use** | **Item** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strong Agree** |
|---|---|---|---|---|---|---|
| 1 | My interaction with a computer is very clear, and I do understand what I am doing. | | | | | |
| 2 | When using a computer, I do not put in much mental effort to understand the system. | | | | | |
| 3 | I find computers to be easy to work with. | | | | | |
| 4 | Getting a computer to do what I want is an easy task for me. | | | | | |
| 5 | Navigating computers is easy. | | | | | |

3.

| **Intention to Use** | **Item** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strong Agree** |
|---|---|---|---|---|---|---|
| 1 | I intend on regularly using a computer in my lessons. | | | | | |
| 2 | I often use technology such as a computer and other technology (tablets, smartboards) tools in my classroom. | | | | | |
| 3 | I believe using technology and computer in the classroom is worth my while. | | | | | |
| 4 | The use of computers and technology is important in my job. | | | | | |

4.

| **Attitudes towards ICT** | **Item** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strong Agree** |
|---|---|---|---|---|---|---|
| 1 | Computers and technology are good at enhancing the learning process for learners. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | Computers are reliable and fast. | | | | | |
| 3 | Computers offer the quickest way of accessing information. | | | | | |
| 4 | Computers and technology can facilitate more collaboration among learners. | | | | | |
| 5 | Computers result in more engaged learners and less disturbance in the classroom. | | | | | |
| 6 | I prefer doing things by hand to using technology or a computer. | | | | | |
| 7 | I am happy with my current teaching methods and do not see a need for a computer or technology in the classroom. | | | | | |
| 8 | I do not foresee using a computer in the classroom to teach. | | | | | |
| 9 | I try and avoid the use of technology in the classroom. | | | | | |
| 10 | I do not intend of using a computer in the future. | | | | | |
| 11 | As an educator, the idea of using technology and computers to teach is a difficult topic. | | | | | |
| 12 | Using ICT will increase my satisfaction as a high school educator. | | | | | |
| 13 | My motivation would increase as an educator if I had adequate access to computers. | | | | | |
| 14 | I use the internet to access current information to teach my learners. | | | | | |
| 15 | The internet will provide me with an easy way of accessing information to teach. | | | | | |
| 16 | Despite the limitation I may have experience in accessing technology and computers; I have a positive attitude about the use of technology in the classroom. | | | | | |

5.

| **Barriers and technology support** | **Item** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strong Agree** |
|---|---|---|---|---|---|---|
| 1 | Lack of infrastructure (computers, overhead projectors, internet.) | | | | | |
| 2 | Lack of educator training in using technology and computers. | | | | | |
| 3 | Lack of time to prepare classroom lessons using technology or a computer. | | | | | |
| 4 | Lack of knowledge to use a computer. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | There are not enough computers to use for all educators in the school. | | | | | |
| 6 | Lack of professional development for educators. | | | | | |
| 7 | The use of technology and computers is not a priority in my school. | | | | | |
| 8 | Unclear how myself and learners will benefit from using technology and computers in the classroom. | | | | | |
| 9 | Educators lack interest. | | | | | |
| 10 | Educators do not support the use of computers in school. | | | | | |
| 11 | School leaders do not support the use of technology and computers in the school. | | | | | |
| 12 | Educators lack necessary ICT skills. | | | | | |
| 13 | Lack of technical support for educators. | | | | | |
| 14 | The current curriculum structure is too rigid. | | | | | |
| 15 | Too much workload | | | | | |

6.

| **ICT Competence** | **Item** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strong Agree** |
|---|---|---|---|---|---|---|
| 1 | I can use a computer keyboard. | | | | | |
| 2 | I can do a PowerPoint presentation by myself. | | | | | |
| 3 | I can operate an excel spreadsheet by myself. | | | | | |
| 4 | I can use the internet for various operations (searching, email, chat, etc.) | | | | | |
| 5 | I can use a computer mouse. | | | | | |
| 6 | I can uninstall and install the software on my computer. | | | | | |
| 7 | I can access all sorts of information on the web for my classroom content. | | | | | |
| 8 | I can use a computer for assessing and grade keeping. | | | | | |
| 9 | I can comfortably use social media networks. | | | | | |

7.

| **Social Influence** | **Item** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strong Agree** |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | I would use technology in the classroom if it was used by people I regard as important. | | | | | |
| 2 | People who are important to me think that I should use technology in the classroom. | | | | | |
| 3 | People I regard as important will influence my behaviour in using technology in the classroom. | | | | | |
| 4 | My colleagues motivate me to use technology in the classroom. | | | | | |
| 5 | People I regard as important would support me to use technology in teaching my classroom. | | | | | |

8.

| **Level of Frequency and Access** | **Item** | **Daily** | **Two times a week** | **Once a week** | **Once a month** | **Never** |
|---|---|---|---|---|---|---|
| 1 | I do have access to a computer at home, and I use it frequently. | | | | | |
| 2 | I do have access to a computer at school, and I use it frequently. | | | | | |
| 3 | I surf the internet frequently at home. | | | | | |
| 4 | I surf the internet frequently at school. | | | | | |
| 5 | I use my computer for work. | | | | | |

# Appendix C

| | usefulness ofict | ease of use | intention to use | Attitude of ict | Barriers of ict | Ict competence | social influence | frequency andaccess |
|---|---|---|---|---|---|---|---|---|
| Mean | 4.3751 | 3.9631 | 3.9328 | 3.6042 | 4.0145 | 4.1601 | 4.1312 | 2.2133 |
| Median | 4.8571 | 4.2000 | 4.0000 | 3.5000 | 4.2000 | 4.6667 | 4.4000 | 1.6667 |
| Mode | 5.00 | 5.00 | 5.00 | 3.50 | 5.00 | 5.00 | 5.00 | 1.00 |
| Std. Deviation | .89417 | 1.19007 | 1.05157 | .46580 | .97864 | 1.09113 | .95255 | 1.33480 |
| Minimum | 1.00 | 1.00 | 1.00 | 2.19 | 1.00 | 1.00 | 1.00 | 1.00 |
| Maximum | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |