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Research Article

Exploring challenges experienced by foundation phase teachers in using technology for teaching and learning : a South African case study

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Article Info	Abstract
    2149-360X/ © 2022 by JEGYS Published by Young Wise Pub. Ltd. This is an open access article under the CC BY-NC-ND license CC BY NC ND	The Department of Education introduced the policy on e-Education in 2004, encouraging all teachers to implement technology for teaching and learning. Despite this encouragement, most South African teachers are experiencing many challenges to effectively use technology for teaching and learning in the foundation phase. As a result of the COVID-19 pandemic, schools had to adapt to the use of technology for teaching and learning. This placed most teachers in a compromising situation since teachers were now forced to engage and use technology for education. For this reason, this study promoted us to explore the challenges experienced by foundation phase teachers in using technology for teaching and learning in two schools in one district in Gauteng Province: South Africa. The Technological Pedagogical Content Knowledge framework was used as a lens to understand the challenges experienced by foundation phase teachers. The authors applied a qualitative research approach within the interpretivist paradigm to explore and understand participants' lived experiences of their challenges. Purposive sampling was used to select eight foundation phase teachers from two schools in Gauteng Province. The findings revealed that most teachers experienced challenges due to lack of knowledge and understanding of how to use technology effectively for teaching and learning; a lack of support from management to promote the use of technology and inadequate, inappropriate and outdated technological resources and equipment. Teachers also indicated that they did not enjoy the support from their senior managers and education officials. They recommended that all teachers undergo focused training and development on the use of technology for teaching and learning and that the education department should consult teachers and ensure that all systems are in place prior to mandating the implementation of technology in the foundation phase.

To cite this article:

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Introduction

The e-Education policy was introduced to all South African public schools to transform education and to prepare learners for the 21ˢᵗ-century demands and needs of using technology (Department of Education [DoE], 2004). One of the primary goals of this policy was the emphasis and obligation placed on education to use technology for the improvement of learning outcomes and skills development. Digital technologies have become an essential part of people's lives and affect all sectors of society, including education. It is for this reason, that the DoE identified the need to introduce the implementation of technology in all phases in the education system (DoE, 2004). Despite the policy mandate, teachers are challenged and reluctant to use technology for teaching and learning (Vandeyar, 2013).

The closure of schools due to the COVID-19 pandemic and the urgency to find alternative ways of supporting learners, prompted many schools to adopt technology for teaching and learning. Most teachers in South Africa and globally held the view that technology will revolutionise the field of education and alter the way they will teach and instruct learners. Despite this knowledge and awareness not all teachers were equally enthusiastic about using technology as part of their instruction. The COVID-19 pandemic placed most teachers in a compromising situation whereby they were forced to use technology for teaching and learning. Teachers were introduced to new technology which they were unfamiliar. They lacked the necessary skills and knowledge on how to use technology for teaching and learning. As a result of this phenomena many teachers in the foundation phase experienced high levels of stress and anxiety.

The DoE (2004) policy was developed and aligned to the Mishra and Koehler's (2006) Technological Pedagogical and Content Knowledge (TPACK) model. This model emphasised the importance of technological content knowledge (TCK) for teaching and learning. Although there is much emphasis on capacity building and relevant and appropriate training for the implementation of technology for teaching and learning, there is a huge gap between teachers abilities, knowledge and understanding to implement technology for teaching and learning (Vandeyar, 2013). The TPACK model clearly articulate the importance of content knowledge (CK), pedagogical content knowledge (PCK) and TCK (Mishra & Koehler, 2006) which is lacking in most South African foundation phase teachers (Ramorola, 2010). According to Powers & Blubaugh (2016), they state that all teachers should have the ability, knowledge, understanding to include basic technology and technological applications in their teaching and learning to develop skills in learners to meet the 21ˢᵗ century needs and demands.

This qualitative case study reported in this article investigated the challenges experienced by teachers using technology in the foundation phase classes (Grades 1-3). The authors formulated the following research questions to guide this study (i) What challenges do early grade teachers experience in implementing technology in their foundation phase classroom? Insight into the different barriers early grade teachers face when using digital technology in their teaching and learning programs could create a better understanding of their challenges. These challenges would assist in developing appropriate recommendations that would motivate and encourage teachers to implement technology in their classrooms. These insights could contribute to what Ayers, Mechling and Sansosti (2013) refer to as launching a process of thinking to enable the development of appropriate learning programs that will accommodate the diverse needs of learners by integrating digital technology more effectively

Powers and Blubaugh (2016) and de Silva, Chigona & Adendorff (2016) agree that the use of digital technology is natural to 'digital native' children (learners); since these children are born into a world where technology has become part of their daily lives. In her study, van Jaarsveld (2017) found that children as young as six months to 8 years interacted with digital technologies with the support of their parents. Digital technology has become the new norm for teaching and learning; therefore, to exclude the use of digital technology in the teaching and learning processes is tantamount to separating their classroom experiences from their daily life experiences. Azarfam and Jabbari (2012) argue that teachers should be mandated to implement technology in their classrooms to accommodate all learners in this digital era. This would require teachers to change their teaching and assessment practices. Teachers continued to provide worksheets and other learning material to learners and expected their parents to support the teaching and learning at home instead of using this opportunity to utilise technology (Jantjie, 2020). The Covid-19 pandemic provided the opportunity for most

educational institutions to embark on an online teaching and learning approach. However, in South Africa, most teachers in the foundation phase seldom use technology for teaching and learning (Hannaway, 2019).

Roualdes (2013) believes that digital technology in the foundation phase classroom remains a powerful means for teachers to enhance their educational programs. Therefore, it is necessary and beneficial for them to become accustomed to and familiarise themselves with the use of digital technology to improve their teaching and learning. According to the National Council of Teachers of Mathematics (2000), teachers need to embrace modern thinking and endeavour to use digital technologies to facilitate learner development. According to the data from the National Education Information Management System (DBE, 2018), the table below presents the information on computer labs in both primary and high schools and those primary and high schools that have internet connectivity.

Table 1

Statistic Data about Technological Facilities of Primary Schools at South Africa

Province	No computers		Internet Connectivity	
	Primary Schools	**High Schools**	**Primary Schools**	**High Schools**
Eastern Cape	4049	685	2456	1322
Free State	388	144	306	171
Gauteng	235	154	280	107
KwaZulu-Natal	2950	935	2342	1964
Limpopo	2138	1119	2546	838
Mpumalanga	735	161	281	275
North West	644	161	281	275
Northern Cape	216	31	0	0
Western Cape	503	70	250	13
Total	11858	3590	9313	5369

Department of Basic Education, 2018. Education Management Information Systems (EMIS)

Gauteng is one of the leading provinces that has been using technology for teaching and learning. According to de Silva, Chigona and Adendorff (2016) there has been an increase in school implementing technologies into their educational programmes. The Department of Education (2004) developed the White Paper on e-Education, highlighting the importance of technology for 21st-century skills. The race to implement technology has come with its benefits and its challenges. Embracing technology at the classroom level is not easy. Cost, access, and time are usually considerable barriers – also referred to by Ertmer (1999) as first-order barriers. Second-order barriers relate to a lack of knowledge regarding how best to integrate technology for the benefit of learners across a diverse range of subject areas (Powers & Bubaugh, 2016). Azarfam and Jabbari (2012) assert that this lack of knowledge leads to fear and anxiety when using and implementing digital technology in educational programs, thus resulting in ineffective implementation.

Project Photos

Computer labs in schools in Gauteng to promote technology use for teaching and learning

This computer lab aims to promote technological enhancement to help learners adapt to the growing digital world of learning.

Learners are using computers games for learning

Figure 1

Project Photos of Schools in Gauteng Province

Looking at ineffective implementation and use of digital technology in teaching and learning programs, this study gives a scopic view on both internal and external factors contributing to this anomaly. Azarfam and Jabbari (2012) stated that the seriousness of anxiety or technophobia among teachers regarding digital technology in classroom practices is often disregarded. Technophobia can typically be defined as a fear of technology, as supported by Brosnan (1998), who describes it as a negative and irrational response or attitude to technology and the use thereof. According to Juutinen, Huovinen and Yalaho (2011), technophobia is essentially causing one of the biggest stumbling blocks for successful digital technology integration into teaching and learning programs. Insight into the challenges foundation phase teachers face when using digital technology in their teaching and learning programs could contribute to creating a better understanding of the fears and anxieties faced by teachers and, in effect, motivate change in teaching practices.

According to Blinnikova (2017), technologies are developing faster that we can grasp and understand it. This lack of understanding causes fear and rejection to implement technologies in teaching and learning. Blinnikova (2017), states that technophobia is an internal resistance that arises when individual begin to think and talk new technology. The COVID-19 pandemic significantly attributed to this phenomena when the Department of Education embarked on online teaching and learning. Since teachers were forced to use technology, there is evidence of high levels of persistent prejudice and negative attitudes towards implementing technology. Research by (Ramorola, 2010) has found that the level of technophobia among individuals can be related to personal traits and person confidence among teachers. Technophobia an also be associated with the fear of losing one's autonomy and control over one's action. Vandeyar (2013) state that teachers are anxious because their learners are more knowledgeable on the use of technology, the different software and programmes. Cascio and Montealegre (2016) argue that the attitude towards any new technology depends on whether it interferes with an individual's self-identity and morality.

Literature Review

Technological Content Knowledge

It is a lack of sufficient technological knowledge that contributes to the challenges to use technology in the foundation phase and the phenomenon of technophobia among teachers. Many foundation phase teachers are under the impression that digital technology and the use thereof cannot meet the learning needs of learners (Azarfam & Jabbari, 2012), thus resulting in a misperception of the effectiveness of the use of digital technology. Teachers need to understand and be aware of the learning needs of all learners in this technologically driven world (Parette et al., 2013), but often this insight is clouded by negative emotions towards the use of digital technology (Juutinen et al., 2011).

Powers & Blubaugh (2016) agree that teachers should have the knowledge, understanding and the ability to include digital technology in their teaching and learning programs. They should also develop educational technology activities appropriate for different learning situations which expect teachers to have sound content and technological knowledge and understanding. Kayalar (2016) further states that although teachers have good content and pedagogical knowledge, they lack technological knowledge. This is confirmed by Hennessey, Habler, and Hofman (2015) who state that teachers often experience difficulty associating theory and practice. The reason could be that, in many third world countries, most teachers are not trained to use technology in their classrooms.

Hennessey et al. (2015) and Davidson, Richardson, & Jones (2014) found that most training programmes concentrate of developing the theoretical (content) knowledge of teachers, and often compromising the practical implementation. Misconceptions thus arise amongst teachers that the use of digital technology is time-consuming and that it distracts from the primary curriculum objective (Hennessey et al., 2015). A finding by Afshari et al., (2009) revealed that teachers have not been trained to implement technologies for teaching and learning. The lack of training has resulted in teachers lacking knowledge and competency to effectively use technology for teaching and learning. Yurdakul et al. (2012), is of the opinion that insufficient technological knowledge is a barrier to assimilating technology integration for teaching and learning, therefore contributing to teachers apathy and reluctance to use technology (Azarfam & Jabbari, 2012).

As learners belong to a technologically driven generation (Huddlestone, 2016), they are interested in technology and focused on its use and development (Gallardo-Echenique et al., 2015). Using technological devices that are of interest to screen-orientated learners, the learners' attitude towards learning changes, opening up a gateway for successful learning (Yurdakul et al., 2012). According to Blair (2012), the role of digital technology in the classroom needs to be seen in a new light. It is crucial for learners to develop specific skills to succeed in a technology-based life. In this regard, critical thinking, creativity, communication, and collaboration must be acquired and developed in a technology-supported classroom and learning environment (Blair, 2012). According to Kayalar (2016), technology offers teachers the opportunity to redesign and modernise teaching resources to suit various learning situations and environments. This provides an opportunity for developing a holistic and interactive learning environment that captures the attention of all learners. This window of opportunity to optimise teaching and learning is lost when digital technology is not effectively used in the foundation phase classroom due to the various challenges experienced by the teacher (Vandeyar, 2013).

Lack of Sufficient Digital Resources and Support

Due to the increasing development and internet connectivity in first-world countries, Terras and Ramsay (2012) state that these developments offer more access to digital technology for teachers. In most developing countries, including South Africa this phenomena is not apparent. This lack of connectivity is one of the reasons why the use of technology is less effective; further, contributing to the challenges and experience of technophobia amongst teachers (Juutinen et al., 2011). It has also been noted by Keengwe, Pearson and Smart (2009) that despite some teachers having access to digital technology devices in their classrooms, they do not receive appropriate assistance and support from school management. Teachers report a lack of support from relevant stakeholders especially when they are faced with technical difficulties and selection of appropriate software content for their learners (Vandeyar, 2013). This lack of support creates anxiety and stress, resulting in an unwillingness to explore and discover the potential the technology can offer. Hennessey et al. (2015) and Ramorola (2010) state that often teachers are not included in the discussion or consultation forums regarding policies and the implementation of technologies for teaching and learning. It has been found that teachers are 'left-out' in the decision making platform or the selection of age-appropriate digital content for their learners. Teachers are the key stakeholders in developing and implementing digital technologies in the foundation phase classroom to develop 21st century skills and therefore they should be consulted in the decision making process (Kayalar 2016; Vandeyar, 2013; Keengwe et al. 2009).

Both Hennessey et al. (2015) and Pelgrum (2001) agree that teacher education, professional development and support have been neglected, especially in African countries in the area of technology and technology upgrade. The implementation of digital technologies in the foundation phase classrooms can effectively create a successful teaching environment which can spark the interest and enthusiasm of young learners towards the use of digital technologies. Unfortunately, implementation is easier said than done (Vandeyar, 2013; Philip & Garcia, 2013).

When looking at the wide range of barriers that prevent the successful implementation of digital technology it is essential to note the impact of teaching culture and the attitude of teachers (George & Ogunniyi, 2016). However, the struggle is not digital technology but rather the implementation thereof in their teaching and learning programs. According to Azarfam and Jabbari (2012), in most cases, teachers revert to using a traditional teaching approach where they are the information holder and the learner must be taught. This teaching method is the least effective way of teaching, but it is the only method of instruction that teachers are most familiar with (George & Ogunniyi, 2016), therefore the revert to the traditional teaching.

Hennessy et al. (2015) confirm that when the focus is on the learners and creating the most suitable learning opportunities by using digital technology, learners will be encouraged to reach their full potential. Unfortunately, this outcome is not always the case because of the challenges teachers experience and their lack of enthusiasm to implement technology. This culture of teaching does impact the successful implementation of digital technology in teaching and learning programs, therefore it is imperative that teachers are encouraged and supported to embrace technology (Lai, 2011).

Theoretical Framework

In this paper, the Technological Pedagogical and Content Knowledge (TPACK) model, proposed by Mishra and Koehler (2006), was used as a lens to explore the challenges experienced by teachers in implementing technology for teaching and learning in Foundation Phase (See figure 1). This model was developed on the Pedagogical Content Knowledge (PCK) model initially established by Shulman (1986, 1987). In addition to the PCK model, the advancement of technology substantially impacts the way we teach and the way students learn. Consequently, the TPACK model was introduced into education which is currently recognised as the most widely used framework to evaluate different perspectives in education with technology (Goradia, 2018; Sang et al., 2016).

There are three core components to the TPACK model: pedagogical knowledge, content knowledge, and technological knowledge. The basic claim of the model is that the proper combination of these components gives way to four other types of knowledge, namely: content knowledge (what); pedagogical knowledge (how), and technological pedagogical content knowledge (which technology/ies) (Elas, Majid & Narasuman, 2019; Oner, 2020). The model presents technology as the third core domain of teacher-knowledge and content and pedagogy (Oner, 2020). Glowatz and O'Brien (2018) argued that various other blended knowledge domains could be derived from the three domains, such as technological content knowledge (TCK), technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK) and TPACK.

Many schools have utilised technology for teaching and learning to improve students' engagement and achievement in the educational context (Andyani et al., 2020). The TPACK model is a useful theoretical lens to explore the dynamic elements in education with technology (Glowatz & O'Brien, 2017). This model further assists in defining teachers' efficiency when using digital technologies (Archambault & Barnett, 2010; Chai et al., 2011). The TPACK model is helpful for understanding, developing and improving tools suitable for effective learning and teaching (Archambault & Barnett, 2010). It is useful, especially in determining the experiences and practices of foundation phase teachers when using digital technologies, as well as the challenges they face. Chai et al. (2011) stated that the TPACK model is an effective framework that can cast light on educational problems experienced by teachers in the 21st century. Mishra and Koehler (2006) mentioned that it is crucial that teachers have a firm understanding of how technological knowledge relates to pedagogical and content knowledge to ensure effective teaching and learning.
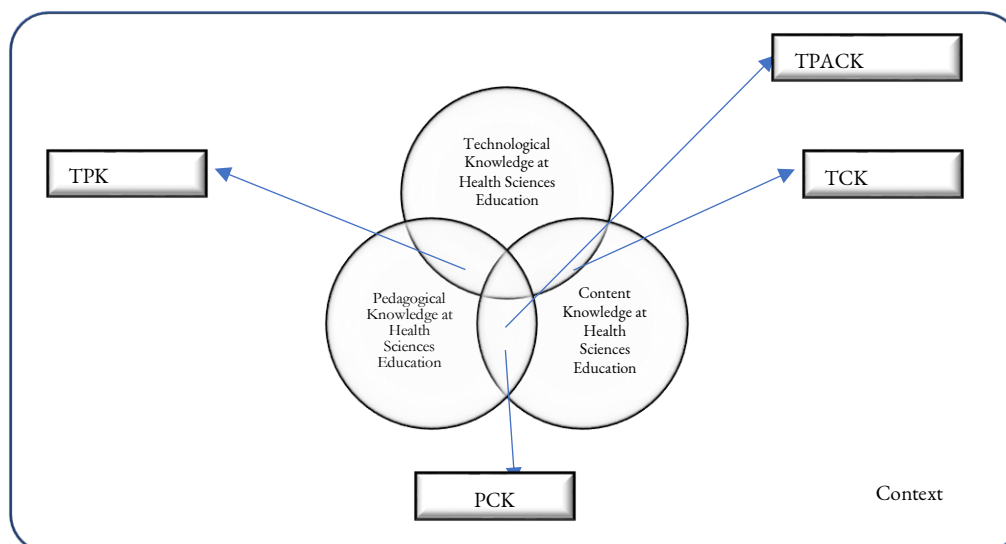
TPK: Technological Pedagogical Knowledge **PCK**: Pedagogical Content Knowledge **TCK**: Technological Content Knowledge **TPACK** : Technological Pedagogical Content Knowledge

Figure 2

The TPACK Model (Adapted from © 2012 by tpack.org)

Aim and Problem of the Study

This study aimed to explore the challenges experienced by foundation phase teachers in implementing technology for teaching and learning. Technology is rapidly gaining momentum across the globe, and still, South African foundation

phase teachers are reluctant, despite the DoE (2004) encouraging teachers to use technology in their classrooms. This study focused on Foundation Phase teachers in one district in Gauteng Province in South Africa. Using the TPACK model developed by Mishra and Koehler (2006) as a lens to explain the challenges experienced by teachers and their reluctance to implement technology. This model articulates and recommends the importance of sound technological content knowledge (TCK) for implementing various technologies for teaching and learning.

Research Problem

The main problem of the research focused

➢ What are challenges experienced by foundation phase teachers in implementing technology for teaching and learning in the foundation phase?

Sub-problems

➢ What strategies can be developed to support teachers to implement technology for teaching and learning.

Methods

Research Model

Qualitative research focuses on the meanings, characteristics, and experiences of phenomena or participants (Lune & Berg, 2017; Yin, 2018). In this study, a qualitative research approach with an interpretivism paradigm was applied to understand the challenges experienced by teachers in implementing digital technology in the foundation phases (Mogashoa, 2014; Yin, 2018). This research approach allows the researchers to investigate the challenges experienced by foundation phase teachers use technology for teaching and learning. The interpretive paradigm is a subjective epistemology that makes sense of data participants' experiences through researchers' interpretation (Kiyunja & Kuyini, 2017); this approach allows the researchers to explore the participants' experiences (Creswell, 2014).

A single case study design was selected in this study, "an intensive study about a person, a group of people or a unit, aimed to generalise over several units", as argued by Gustafsson (2017:2). Two different schools in Gauteng were selected as the case. Both schools were identified as recipients of many digital technology devices to be used as part of an upliftment program. This method provided an opportunity to explore a particular in-depth investigation on significant factors of a phenomenon, which referred to the experiences of technology in this study (Yin, 2018).

Participants

Eight (8) participants were selected in this study from two different schools in Gauteng Province. Only teachers who were teaching in the Foundation Phase were invited to participate in this study. Teachers were informed of the data collection process prior to them consenting to participate. All eight participants agreed and signed the consent forms to participate in a separate focus group interview. Two interviews were held, one in each school with all the participants.

For this study, the codes T1FRA –T8F3B were used. The T refers to teachers; number 1-8 refer to the participant number; F refers to females; R-3 refer to grades R-3 and A and B refer to the two schools. The authors ensured the focus of the study was to delve into the views and perceptions of the identified participants towards the experiences of teachers using technology in the Foundation Phase during the Covid-19 lockdown.

Table 2

Structure of Participants

Participant No	School	Gender	Code
Teacher 1 – Female - Grade R	A	F	T1FRA
Teacher 2 – Female – Grade 1	A	F	T2F1A
Teacher 3 – Female – Grade 2	A	F	T3F2A
Teacher 4 – Female – Grade 3	A	F	T4F3A
Teacher 5 – Female – Grade R	B	F	T5FRB
Teacher 6 – Female – Grade 1	B	F	T6F1B
Teacher 7 – Female – Grade 2	B	F	T7F2B
Teacher 8 – Female – Grade 3	B	F	T8F3B

The two identified schools were recipients of many digital technology devices through the teacher and learner empowerment project as part of an upliftment programme. The researchers used a purposive sampling strategy to identify the research sites. The criteria for selecting both these schools were very specific and purposive: they had to be primary schools in Gauteng province; the school had to use digital technology to support lessons and the participants had to indicate their willingness to voluntarily participate in the research project.

Data Collection Tool

Data collection is a systematic process of gathering information to answer research questions and evaluate outcomes (Kabir, 2016). The researchers used a semi-structured open-ended interview schedule as the data collection instrument. Interviews allow researchers to investigate phenomena with specific purposes and still maintain the flexibility of inquiry, according to Cohen, Manion and Morrison (2018). Consequently, semi-structured open-ended interviews were conducted to elicit information on teachers' experiences of using technology in the Foundation Phase.

Semi-structured Interview Form

The researcher developed the semi-structured interview form. The form was divided into two subsections, A and B. Section A requested biographical data, and section B elicited participants' responses regarding using technology in the Foundation Phase. The researcher followed the guidelines advocated by Maree (2020), that most questions should be open-ended to give participants the opportunity of sharing their personal, lived experiences of the phenomenon under study; that the researchers use language that the participants can understand and respond appropriately; and that questions should not be leading to a particular response. Finally, all questions should be short as possible. To ensure the validity and unbiasedness of the questions, the researcher presented the questionnaire to senior staff members in the Early Childhood Education department at the University of Pretoria to critique and advise whether the questions were clear, concise, appropriate and unambiguous. Since there were no severe modifications, the instrument was valid and suitable for this study (Annexure A).

Data Analysis

The six-step thematic analysis was adopted in this study to identify similar and dissimilar views with qualitative data and make sense of important themes in the research (Creswell, 2014; Maguire & Delahunt, 2017). Post transcription and member checking took place to ensure that the data was correct and without misinterpretation (Maree, 2020).

Ethics

Ethics approval was granted by the ethics committee of the University of Pretoria (EC16/06/01) and the Gauteng Department of Education. All participants were formally invited and signed the consent forms agreeing to participate in the study willingly. They were further informed of voluntary participation and were not obliged to remain throughout the study. All participants consented to participate in the face-to-face interview at their school. They were guaranteed anonymity and confidentiality of their participation. They were also informed that no names would be used during the reporting phase of the study. The table above presented each participant with a code as a pseudonym to uphold this clause.

Results

The participants in this study were a homogenous group of foundation phase teachers. Only females participated in this study since most foundation phase teachers in South Africa are females. All these teachers had more than five years of teaching experience and had some experience in the use of technology for teaching and learning. The objective of this study was to explore the challenges experienced by Foundation Phase teachers when using technology for teaching and learning. Four (4) broad themes emerged from the focus group interviews, which revealed significant challenges:

➢ Teacher's knowledge and skills and attitudes toward technology
➢ Lack of resources, maintenance and technical support
➢ Poor support from school leadership and management
➢ Teacher development and training.

Theme 1: Knowledge, Skills and Attitudes towards Technology

In preparation for the effective implementation of digital technology in teaching and learning programs, 21st-century teachers need to possess the knowledge, skills, and understanding of digital technology for teaching and learning (Mishra & Koehler, 2006; Powers & Blubaugh, 2016). This view was agreeable to all participants in the study. T3F2A voiced her view by stating, *'we are moving into the 21st century and our young children know how to use computers, laptops and iPad. I will need to learn how to use these if I want to be a teacher in the 21st century.'*

Findings reveal that many teachers lack ICT related knowledge and understanding. Even when the proper resources are available, teachers often struggle as a result of inadequate knowledge and understanding of specific technology, technology-supported pedagogy, and technology-related classroom management. This phenomenon is echoed by T1FRA who stated, *'although I used computers at home for typing, I have no knowledge of how to teach computers to children. My son showed me how to capture marks for my class.'* T3F2A and T4F3A also agreed with T1FRA.

> *They stated that they were in a similar situation. They get support from their partners on using computers and other ICT technology at home. They also indicated their lack of enthusiasm to learn because of fear that they may "break or damage" the equipment. Furthermore, they stated that they were old teachers and ready to retire; therefore, it was futile for them to learn to use computers, iPad and other digital equipment.*

Despite their lack of enthusiasm and other factors to use technology, all the participants agreed that they have the resources at home but lack appropriate knowledge and skills to implement the technology for teaching and learning. They also indicated that if they were given the necessary training on how to use computers and the programs, maybe they will be willing to implement.

The findings suggest that most teachers have some experience using computers, but they may lack the opportunity to use them in the classroom as a learning resource. They may, therefore, struggle to use digital technology to improve their teaching and learning. Ramorola (2010) states that for many teachers who are new to computers or the internet, the use of technology for teaching and learning can be a fearful experience. T5FRB aptly voices this view. T7F2B said, *'our department of education want us to use computers in our classroom and they talk of 21st-century skills, it's easy for them to say that, yet they do not understand or know how scary it is for an over 55-year-old foundation phase teacher to start using a computer for the first time.'* T5FRB agreed with T7F2B when she said, *'I am more embarrassed in class when my learners tell me that I am not doing the right thing. I might as well not use the computer room than go there and struggle. My learners seem to know more about computers than me. It's kind of embarrassing with my grade Rs."* When a teacher finds technology overwhelming or frightening, it is unlikely that they will use technology for teaching and learning. Teachers may be reluctant to incorporate technology in their planning for teaching and learning.

The choice of whether and how to use technology for teaching and learning is dependent on the teachers and the views and perceptions they hold about technology. The participants' attitude towards the use of digital technology in their teaching and learning programmes was ambivalent. Eight respondents indicated:

> *they do not mind using technology for teaching and learning. They believe that they should be capacitated with the appropriate knowledge and skills to use ICT technology in the foundation phase classroom. They also agreed that the technology is becoming popular among children when they see how their children use cell-phone technology and iPads for games.*

T2FRA and T3F2A said, *'technology and computers are everywhere, look at the shops, internet café, cell phones, iPad, these children know them all. Give your foundation phase learners a cell phone and they will change the screen, ringtone and everything – you look like an idiot in front of them.'* T8F3B concluded by saying, *'I would like to use technology...we as teachers don't have the appropriate skills to implement technology correctly, and it can be of help to our learners.'* In contrast, T5FRB indicated that she did not want to use digital technology in their classrooms due to her lack of knowledge and understanding. She indicated, *'there were too many challenges, making it impossible to implement and maintain the use of digital technology on a more frequent basis and in more learning areas.'* For these reasons, T5FRB

indicated that she did not want to use digital technology to support her teaching and learning programmes. Ramorola (2010) agrees that teachers who are not confident to use technology refrain from using it in the classroom. Along the same lines, T6F1B indicated: "*I don't know how to use it (digital technology) as part of my lessons...*" This reveals that a lack of knowledge and skills to use digital technology in learning programmes is one of the main reasons digital technology is not being effectively implemented in classrooms. Once again, T5FRB blatantly stated that '*someone must come and train me very well in computers before I can change my mind to use it in my class. Otherwise, they must give me a teacher-aid who can help me in the computer room.*' This statement by the participant shows how desperately teachers need sufficient training and support.
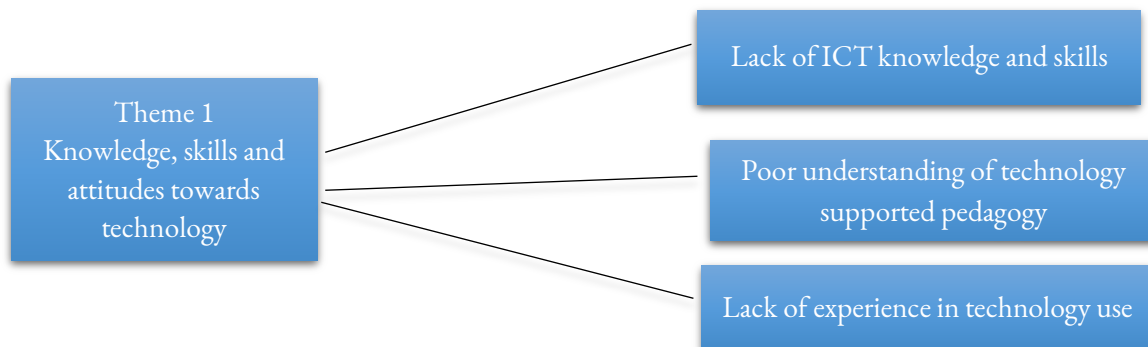

Figure 3
Codes of First Theme

Theme 2: Lack of Resources, Maintenance and Technical Support

Data obtained from the participants revealed that their school did not have sufficient equipment such as computers, printers, scanners, mouse, mouse pad, updated internet connection. They noted that this posed a significant challenge to them in the foundation phase as they had large classes and few computers. Learners were forced to sit in groups of five around one computer. They indicated for example, '*we cannot manage our learners in the computer lab. There are so few computers and children are constantly fighting with each other to use the computers.*' T4F3A said, '*I have to manage discipline in the classroom, instead of showing them how to use the computers.*' T7F2B and T8F3B agreed that '*schools should provide more computers and larger computer classrooms to accommodate all the learners. These small heated rooms with just a fan to cool the place is not enough for us.*' T2F1A further articulated that '*more often when I go to the computer room there is no internet connection or we have power outages. I just waste my time going to the computer labs. I can spend that time teaching reading in my class.*' T4F3A, T5FRB, T7F2B and T8F3B indicated that the use of digital technology in teaching and learning programmes is made 'very challenging', with limited resources available to them. Seeing that resources are limited, participants seemingly face a hefty challenge in classroom management when implementing digital technology in their classrooms. It is the experience of T1FRA that '*[l]earners also become lazy, it's like they don't want to do regular classwork after working with the computers.*' T5FRB supports this by stating: '*I experience a big problem in class discipline when I try and use technology in a lesson, it is as if the learners become different, they are so unruly'.* The findings highlight discipline is a major challenge for most teachers during and after computer lessons. Participants indicated that learners lacked the enthusiasm to revert to normal teaching. They found their learners became more playful and disobedient.

Another major challenge experienced by teachers is maintenance and technical problems. T2FRA states '*every time I go to the computer lab, I always find computers not working. I must send a message to the secretary in the office. I have to wait and wait, no one comes to help. Then time is up and we have to leave.*' T4F3A also indicated that she has similar problems, for me '*it's just bad luck, whenever it's my turn to use the computer room, there's no power, or the cables are gone missing. It is so frustrating walking my learners to the lab and then finding out that there is no power. My principal tells me to do a theory lesson, what do I know about computer theory. All I can tell them is that this is a mouse, computer screen, keyboard...*' Many teachers are unfamiliar with using technology and technical problems which exacerbate the situation. Teachers are left helpless with a rowdy class of learners. There is no qualified technician in the computer labs to assist teachers timeously. Participants stated that all schools should employ technical support from outside services since the

education department does not provide this service. As a result of maintenance and technical problems, lessons are often disrupted and teachers cannot make use of the technology in the laboratory.
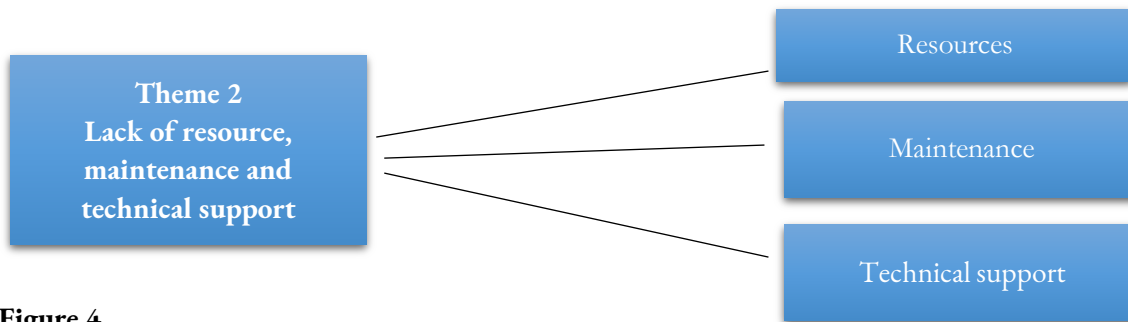

Figure 4

Codes of Second Theme

Theme 3: Poor Support from Principals and School Management Team (SMT)

The school principal and the management team play a crucial role in supporting their teachers to use technology in the foundation phase. The following issues contribute to the effective implementation of technology: leadership, school timetabling structure and school planning. If these issues are not properly managed they can become difficult to overcome since the authority at school lies with the school management. T1FRA and T3F2A indicated that

>*their principal does not believe in using computers for teaching and learning. In no uncertain terms, he has indicated to his teachers that they should concentrate on teaching their learners to read, write and do mathematics. He has indicated that children can learn about computers when they are in the senior phase. Foundation Phase should focus on the 3Rs (Reading, Writing and Arithmetic).*

T4F3A also agreed with her colleagues, T1FRA and T3F2A. She commented that

>*the principal made it very clear that children can learn to use computers, cell phones and iPods at home and not in school. The computer periods should be used to teach reading skills or mathematics.'*

When school principals and the management teams are unsupportive or uninformed about the value of technology for teaching and learning, teachers tend to lose interest in using the available technologies at schools. T7F2B and T8F3B agreed when they said, *'this is one of the biggest reasons teachers don't want to use computers. We have managers who don't support us, why must we break our heads.'* It was found that if school leaders are not interested in technology, they are not willing to utilise funds to improve technology. T6F1B stated '*when things break in the computer lab or get stolen, they are never replaced. The principal and secretary are always telling us that they have no money to repair or connect the internet.*' In the Foundation Phase, heads of department (HoDs) emphasised writing skills, thus preventing teachers from using technology. They do not see the need for technology in the foundation phases. T1FRA said, *'my HoD is the same, she too comes from the old school of thought, just like the principal, reading, maths and writing. That's all she wants every day from us'.*

Another challenge is placing technology (computer) lessons on the school timetable. SMTs usually place technology (computers) just before lunch break. Teachers have just an hour to be in the technology lab, and these labs are situated far away from the foundation phase classes. Learners take a while to walk to the classes, and by the time they settle down, almost 20 minutes of their time is gone. Teachers indicated that the limited time they have to use the computers is then spent on discipline and classroom management, then using technology to enhance learning.

All of the respondents indicated that they did not receive sufficient support. As a result of the lack of support they experienced challenges in implementing technology in their classes. Most of the participants articulated that they require support in the computer laboratory with issues pertaining to computer hardware and software usage. All the participants agreed that they are not sufficiently supported to identify age-appropriate educational programs for their learners. Participants also indicated that the hardware/devices needed to be upgraded, maintained and repaired for effective implementation of technology. It was mentioned that teachers do not have the time, skills or knowledge to ensure that the technological devices are in good working condition. They believed that the school should contract professionals outside support to maintain the computers and other ICT equipment. T5FRB stated:

> *when a device is damaged or when it needs updates and stuff like that, we don't know how to fix this and we have no one that can help us. It really helps with skill development, but it is not practical to implement it on a permanent basis.*

All the participants agreed that insufficient support and poor hardware maintenance in the computer lab cause teachers not to implement technology in their teaching. Seeing that it attributed to anxiety and stress experienced by teachers.
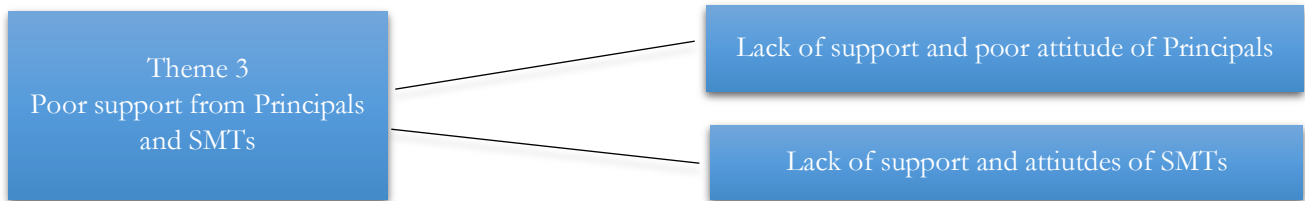

Figure 5
Codes of Third Theme

Theme 4: Teacher Development and Training

Teacher training and development are critical components for the effective implementation of the curriculum and, more especially the use of technology in the classroom. Many schools lack qualified technology teachers, which is evident in the foundation phase. Teachers are called for a one-day workshops and are expected to implement technology in their teaching and learning. When the participating teachers were asked whether they felt that they were sufficiently trained to implement digital technology in their teaching and learning programs, all participants indicated, that they were insufficiently trained to effectively implement digital technology in their classrooms and to incorporate it into the curriculum they teach.

T7F2B stated, *'we don't get trained properly and we don't receive any support to implement technology in our classrooms.'* T5FRB and T6F1B further indicated that '*the training they give us is more a crash course in computers; we come out worse than we went in. Sometimes, I am more confused with all the computer jargon.'* T1FRA *stated that 'if only they make the training more practical, I am certain we will learn more. Too much theory and less practical, yet they still want us to implement in our foundation phase classes.'*

It was observed that teachers were willing to learn and develop new teaching methods through the use of computer technology in the classroom. They all agreed that they should be given intensive continuous training at least once a month. There were enthusiasm among teachers to receive appropriate training, however the few training opportunities they received was not adequate. These trainings and workshops did not provide teachers with the hands-on experience which they required. Thus, these trainings did not meet the needs of teachers to effectively implement technology in their foundation phase classrooms. T2FRA and T8F3B clearly indicated that insufficient training was one of the main reasons teachers did not use digital technology in their classrooms. T6F1B further stated that *'that is the main reason I do not use technology in my classroom. I don't know how to use the devices that were given to us at the school, never mind how to implement it in my teaching*.
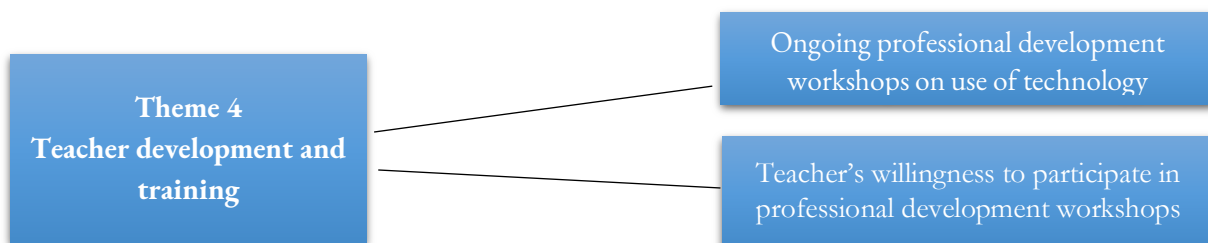

Figure 6
Codes of Fourth Theme

Discussion

The article aimed to understand better the challenges experienced by foundation phase teachers in implementing technology for teaching and learning. The findings of this study are significant as it reveals that foundation phase

teachers experience the following challenges: lack of in-depth understanding of the use of technology, leadership and technological support, insufficient resources and insufficient capacity and training programmes.

In-depth Understanding of the Use of Technology

The data collected from participants revealed that most foundation phase teachers lacked in-depth knowledge and understanding of using technology for teaching and learning. Foundation phase teachers in this study lacked sufficient technological pedagogical knowledge. The findings concur with Vandeyar (2013) who also found that most South African teachers are expected to implement technology into their education programs, but are not appropriately trained in the use of technology. The findings also highlighted that participants were exposed to computers, iPods, cell phone technology, but most had minimal experience in using technology and were supported by a family member. This was revealed by participants T1FRA, T2F1A and T3F2A. Yurdakul et al. (2012) stressed the importance of teachers developing technological pedagogical knowledge to understand better how to use technological tools for teaching and learning. Levy (2009) agrees that foundation phase teachers need proficient pedagogical content knowledge to establish a holistic view of how technology improves and enhances teaching and learning. Foundation Phase teachers need to develop themselves competently on how to implement technology in the foundation phase. According to Azarfam and Jabbari (2012), if teachers do not empower themselves with appropriate knowledge and understanding of technology in the classroom, this may lead to anxiety, fear and a reluctance to use technology for teaching and learning. Vandeyar (2013) also concurs by stating that most South African teachers are not eager to implement technology in their classrooms due to the lack of knowledge, understanding and ability to operate ICT equipment.

School Leaders Role

School leaders play a significant role in leading the use of digital technologies. According to Lindqvist (2019), those school leaders who encouraged the use of digital technologies found favour and enthusiasm among their staff. Their teachers were more eager and willing to use technology for teaching and learning. This study revealed that most teachers did not receive the desired support from their school management teams. The findings highlight that school leaders emphasised the importance of teaching 'Reading, Writing and Numeracy' in the foundation phase. This was revealed by participants T1FRA and T3F2A. Keengwe et al. (2009) agree that teachers do not receive appropriate support and assistance from the school management team. Teachers complained that official from the department also did not support them or guide them on how to use technology to enhance their teaching.

Technological Support and Technical resources

Most participants experienced a lack of support regarding technical resources and technological support. In this study, it was found that participants often had to take their young learners to the computer laboratory which was away from their classes. Participants indicated that they lost quality time and often the resources were not readily available to all learners. Learners had to sit in groups of five around one computer, which disadvantaged learners from getting access to the computers. Furthermore, the time allocated for computer lessons were an hour and this was insufficient for all children to participate in the activities actively. Participants often experienced defective equipment and other resources in the computer laboratory. They complained that computers were not in working order, they could not access software, power-failure, items such as mouse, mouse-pads and cables were often missing. Ramorola (2010) states that for successful use of technology in classes, more computers, printers, scanners, mouse, mouse-pads, interactive smartboards, data projects, and age-appropriate software should be made available to all foundation phase classes. All these resources should be available to all learners.

Training and Development

The DoE (2004), through its e-Education policy, encourages all teachers to implement technology for teaching and learning. The participants in this study indicated that they lacked the appropriate training and development on successfully implementing technology for teaching and learning. According to the TPACK model, teachers need to be capacitated with the appropriate technological pedagogical content knowledge to successfully implement technology for teaching and learning (Koehler & Mishra, 2008). This view is supported by Vandeyar (2013), who states that teachers

need to receive appropriate and relevant training and development to implement technology in their classrooms successfully. Hennessey et al. (2015) and Ramorola (2010) believe that teachers are significant people for the effective implementation of digital technologies for the 21ˢᵗ classroom. It is therefore imperative that they receive ongoing teacher training and development.

Enthusiasm and eagerness to learn and develop new ways of teaching using digital technologies were not lacking amongst most teachers. The authors recommended that the DBE should plan focused training and development workshops to all teachers in the district. The meeting of teachers from different schools would encourage network learning communities to be formed as support groups. The communities of practice will allow foundation phase teachers to identify with teachers who are faced with similar challenges. This support group will motivate and encourage teachers to use technologies in their classrooms. According to the DBE (2011) communities of practice and network learning communities play a significant role in personal professional development of educators.

For the successful implementation of digital technologies for teaching and learning it is pertinent that the education department ensures that the necessary infrastructure, resources, teacher development programmes, and ongoing support are carefully planned, before embarking on a large scale implementation of technology in the foundation phase classes. Teachers will use technology appropriately and effectively if they are conversant and comfortable with it, especially if they have had sufficient experience to technology in an instructional environment.

Conclusion and Recommendations

The planned integration of digital technology into teaching and learning programs in many South African schools are seldom successful. There are many challenges and hurdles to overcome to achieve effective implementation of digital technology in classrooms. According to Yurdakul et al. (2012), a significant barrier to technology integration is teachers' lack of knowledge and competency. Teachers are challenged to implement and manage the use of technology successfully. Roualdes (2013) agrees when he states that many foundation phase teachers admit to being unprepared to face the challenges of diverse learning needs. Therefore, teachers find it extremely difficult to adapt the curriculum and incorporate technology into their daily teaching and learning (Wilson et al., 2011). Several factors collaboratively contribute to the unwillingness of teachers to implement digital technologies for teaching and learning.

Although there is much apathy and lack of enthusiasm to implement technology for teaching and learning, there are some teachers who have shown positive attitude towards using technology for teaching and learning. These teachers have found that their learners benefitted from technology lessons. For this reason and others, teachers are willing to make the sacrifice and attend professional teacher development programmes to capacitate themselves. They see technology playing a significant role in education in the future. The COVID-19 pandemic has hastened the process of implementing technology in the classroom, despite most teachers being unprepared for the suddent sign in teaching and learning. Vandeyar (2013) and Blinnikova (2017), agree that if teachers are given the necessary support from their school leaders and school management teams, they would show positive attitude towards implementing technology in their classrooms. Furthermore, teachers must be given the necessary technical support and resources for effective teaching and learning using technology. It must also be noted that, despite the many challenges, teachers indicated that they enjoyed some positive experiences and learning with their foundation phase learners in the computer laboratories.

It is recommended that teacher education programmes are reviewed and that the content of these training programmes is carefully aligned to the needs of teachers in the foundation phases. Training should consider the pedagogical, technological and content knowledge, focusing on the skills to effectively integrate all knowledge fields that will effectively implement digital technology in foundation phase classrooms. Teachers should be supported continuously to implement technology. This support should include hardware support, where equipment is regularly serviced and in good working conditions. Software support is also essential, where teachers can consult with professionals regarding the most updated technological programmes that will be best suited for specific teaching programmes in the foundation phases. This support will ensure that digital devices are used effectively to promote the optimal development of foundation phase learners.

Enthusiasm and eagerness to learn and develop new ways of teaching using digital technologies were not lacking amongst most teachers. It is, therefore, recommended that professional development programmes for improved capacity building should be planned and well-coordinated. The DBE should encourage network learning communities and communities of practices to be established as envisaged in the Integrated Strategic Planning Framework for Teacher Development in South Africa (DBE, 2011). The communities of practice will allow foundation phase teachers to identify with others in a similar situation. This support group will motivate and encourage teachers to use technologies in their classrooms. There should be focused training on using various updated age-appropriate applications and software.

It is recommended that the education department should ensure that the appropriate infrastructure and other resources are readily available before large scale implementation is carried out. Teachers will use digital technology if they are accustomed and comfortable with the technology. Teachers need to have sufficient experience to technology in an instructional environment with support from the school leaders and management teams, including education officials. According to Mishra and Koehler (2006), the TPACK model emphasises the importance of content knowledge. Since the education department is encouraging teachers to use technology for teaching and learning, it is important that the education department make provision for the necessary and appropriate training and development for all teachers. Through ongoing professional development, teachers would be empowered with knowledge and understanding of implementing technology for teaching and learning.

Recommendations for Further Research

Since this study was limited to two primary schools in a district in Gauteng Province, it is recommended that further studies of a similar nature be conducted in different provinces in the country with a larger sample. The findings may vary significantly since some provinces are the forerunners in using technology in their classrooms.

Limitations of the Study

The research was limited to a small sample of two schools in the Gauteng Province district. The authors believe that the findings may vary in other districts across the province and country. Some schools are engaging successfully with technology due to the Covid-19 pandemic and the call for online teaching and learning.

Acknowledgement

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Annexure A

Individual Semi-structured Interview Schedule

Faculty of Education (University of Pretoria logo)
Individual Semi-structured Interview Schedule
Interview questions/prompts (the questions are only guidelines and the researcher will further be guided by the data gathered from the focus group interview and the completed semi-structured questionnaire).
Please specify your age
Q1. How long has your school been using digital technologies
Q2. How often do you use digital technologies in your classroom?
Q3. Share your experience on the use of digital technologies in your classroom.
Q4. What are the challenges you face when implementing digital technologies as a support tool?
Q5. How are you supported at your school to implement digital technologies?
Q6. What training and capacity building programmes have you attended on use of technology in the classroom?
Q7. How often were these training/workshops/capacity building programmes done?
Q8. How do your learners experience the use of technology for teaching and learning?
Q9. What kind of support do you require to enhance your skills in the use of technology?