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ABSTRACT:

The South African Department of Basic Education (DBE) has considered the introduction of Tablet PCs an important aspect in improving the quality of education in South Africa. The Covid-19 pandemic has hastened the introduction of Tablet PCs due to the increased need for distance and online learning. Educators are often unwilling to accept and use Tablet PCs for teaching and learning because they do not have the necessary skills to integrate Tablet PCs into their pedagogical practices. This paper discusses the practical implications of the introduction of Tablet PCs into previously disadvantaged schools in South Africa specifically during the Covid-19 pandemic. To provide guidance to the DBE, principals, and educators to promote effective use and acceptance of Tablet PCs by educators for classroom and distance learning.

Keywords: TPACK, Community of Practice, Connectivity, Technology Acceptance, Tablet PCs

I) INTRODUCTION

Tablet PCs are being introduced into schools across South Africa in an attempt to improve learning outcomes by providing access to technology, potentially decreasing the digital divide, and seeking to nurture engaged learners [Department of Education, 2004]. The coronavirus pandemic (Covid-19), which began in March 2020, hastened the introduction of Tablet PCs in schools in South Africa. The South African Government declared a state of national disaster which led to schools being closed and educators having to find alternative new means to teaching and learning [Zuma, 2020]. When the government reopened schools, classrooms could not exceed 50% capacity on any given day, and social distancing was required to ensure the safety of educators and learners [Department of Basic Education, 2020]. Therefore, the introduction of Tablet PCs was accelerated to improve the continuation of learning during the Covid-19 pandemic.

Despite Tablet PCs being introduced into schools, there is often a lack of training concerning integrating Tablet PCs into the existing pedagogical practices of educators. Many South African studies have highlighted that educators are often not trained to effectively use technology for teaching and learning [Adukaite, van Zyl and Cantoni, 2016; Herselman and Botha, 2014; Nkula and Krauss, 2014]. Consequently, educators are often reluctant to use technology for teaching and learning activities.

This paper describes an action design research study conducted in a single, previously disadvantaged government school in the Eastern Cape of South Africa. The study sought to investigate the use of Tablet PCs in teaching and learning during the COVID-19 pandemic, with a view to better understanding the needs and pitfalls of introducing Tablet PCs into teaching and learning activities in order to promote continued education. The paper is divided into four sections: describing background literature, research methodology, findings, and the implications of introducing tablet PCs into teaching and learning activities with a view to promoting continued learning.

II) LITERATURE AND FRAMING

This section describes the context in which the educator participants found themselves during the Covid-19 pandemic; in an attempt to understand the factors that might influence the educator when technology is introduced for teaching and learning activities.

The section is divided into four subsections: firstly, focusing on the broad implications of Tablet PCs use in education, secondly describing how the Covid-19 pandemic affected education in South Africa and specifically technology in education. Thirdly, aspects of an educator's environments such as connectivity, changes to pedagogical practices, and support networks are discussed. Finally, the aspects of an educator's personal characteristics that affect technology use such as skill level and technology acceptance are also discussed.

Impact of Tablet PCs on Education

Tablet PCs are being introduced into education in many countries [Zhang et al., 2016] with the hope of improving education [Tamim et al., 2015]. This introduction can be seen in both developed and developing countries [Zhang et al., 2016]. In developing countries, the goal of introducing Tablet PCs includes providing access to learning resources [Maina et al., 2015], reducing inequalities [Ferrer, Belvís and Pàmies, 2011], and providing educational reform [Pamuk et al., 2013].

The use of Tablet PCs in education has the potential to improve learning outcomes when used effectively for teaching and learning activities [Maina et al., 2015; Ferrer, Belvís and Pàmies, 2011; Pamuk et al., 2013; Wims and Lawler, 2007]. Effective use of technology refers to the integration of Tablet PCs into the pedagogical practices of the educator to ensure learning takes place with or through the use of technology [Gil-Flores, Rodríguez-Santero and Torres-Gordillo, 2017]. Access to Tablet PCs does not necessarily lead to the effective use of the Tablet PCs. Training needs to accompany the provision of devices to ensure effective use [Gil-Flores, Rodríguez-Santero and Torres-Gordillo, 2017; Rubagiza, Were and Sutherland, 2011]. Training should include both technological knowledge and knowledge of integrating Tablet PCs into educators' existing pedagogical practices [Samarakoon, Christiansen and Munro, 2017]. However, a lack of educator training can be seen worldwide [Pamuk et al., 2013; Rubagiza, Were and Sutherland, 2011; Farias et al., 2013; Wastiau et al., 2013] and needs to be more than IT competency training to ensure effective integration of technology into teaching and learning activities [Pamuk et al., 2013; Drent and Meelissen, 2008].

South African studies have also highlighted the need for professional development amongst educators to ensure that technology is adopted and used effectively for teaching and learning activities [Adukaite, van Zyl and Cantoni, 2016; Herselman and Botha, 2014; Nkula and Krauss, 2014; Lupondwana and Coleman, 2019; Hart and Laher, 2015]. Ultimately, educators need to be willing and able to use technology in the classroom. This can be achieved by providing professional development and ensuring educators are equipped to use technology [Herselman and Botha, 2014]. Given that the Covid-19 pandemic has hastened the introduction of Tablet PCs to Grade 12 learners at South African government schools, it is therefore essential to understand the effect that the Covid-19 pandemic has had on education in South Africa and properly equip educators.

Impact of Covid-19 on Education in South Africa

The South African Government has been emphasising the need for ICTs in education for many years, focusing on introducing Tablet PCs into education [Department of Education, 2004]. Introducing Tablet PCs aims to provide increased access to technology, improve equity, provide redress [Department of Education, 2004], and reduce the digital divide [Hart and Laher, 2015]. ICTs play a pivotal role in education and should be exploited to provide open-access and ubiquitous learning for learners across South Africa [Department of Science and Technology, 2019]. The introduction of Tablet PCs was hastened by the Covid-19 pandemic which resulted in school closures across the country during numerous lockdowns over the last 18 months. Due to these school closures, there was a greater need for online and distance learning to ensure the continuation of learning and reduce the loss of learning as a consequence of school closures [Gustafsson and Nuga, 2020].

Consequently, many schools received government issued Tablet PCs to promote distance and online learning as highlighted by President Cyril Ramaphosa in his State of the Nation address in 2020 [President Cyril Ramaphosa, 2020].

Although access to devices has been provided, it does not necessarily mean that educators will adopt and use the technology. Technology is considered to be an Amplifier of Existing Institutional Forces [Toyama, 2011] and often broadens the digital divide between those who can effectively use technology and those who cannot [Toyama, 2011]. The amplification of institutional forces can occur in three ways: differential access, differential capacity, and differential motivation. Differential access refers to the varying technologies and connectivity that individuals are able to access. This degree of access to both technology and connectivity, such as data, affects their ability to use technology and specifically for learning [Toyama, 2011]. Differential capacity refers to individuals having the necessary skills to use technology in their daily lives and their variation in skill levels. If individuals do not have the requisite capacity to successfully make use of technology, they are less likely to adopt and use technology [Toyama, 2011]. Differential motivation refers to how willing an individual might be to use technology to improve their life. Differential motivation can be affected by an individual's capacity and access. A person is more likely to adopt technology if they have access to both a device and connectivity as well as the necessary skills to use that technology effectively [Toyama, 2011]. These amplifiers need to be understood as technology will only increase and accentuate the inequalities that are already experienced in the classroom [Rodríguez, Nussbaum and Dombrovskaia, 2012]. Capacity and motivation need to be considered when technology is introduced into the classroom, as only motivated and trained educators are likely to be willing and able to integrate technology into their pedagogical practices [DiMaria, 2016].

Connectivity

As discussed previously, differential access refers to access to a physical device and connectivity such as data to ensure that the devices can be used effectively. Cornu [2004] argued that Society is networked as a result of the invention of the Internet and other communication technologies [Cornu, 2004].

Consequently, information is being shared in non-linear ways, and new connections are being formed, with new ways to communicate. It has become important for education to take advantage of these new connections to ensure that learners can learn to discern accurate, truthful information and knowledge to ensure continued learning in schools [Cornu, 2004].

Cornu [2004] further contends that the introduction of communication technology has led to a new form of collective intelligence which refers to a group of individuals working together with favourable outcomes for the whole group [Kong and Yu, 2016]. As such, learning should no longer be considered an individual task but a collective task that could be promoted through the Internet, ICTs, and access to connectivity [Cornu, 2004].

Blended Learning

The introduction of technology into teaching and learning activities should change educators' pedagogical practices to ensure that technology is used effectively in the classroom and for distance learning [Adu and Galloway, 2015]. Blended learning techniques are the most common realisation of changes to instructional practices; attempting to integrate technology into education [Nazarenko, 2015].

Blended learning refers to using technology so that traditional educational processes are blended with new technological advances to bring about new and exciting learning experiences [Nazarenko, 2015]. This learning process brings together both synchronous and asynchronous learning to provide a holistic learning experience for learners [Garrison and Kanuka, 2004]. Blended learning is considered an important change in education as the need for digital competencies is high in the 21st century [Kostaris et al., 2017], and teaching is now considered a constructivist process where learners are expected to construct their own knowledge and understanding [Nkula and Krauss, 2014].

Blended learning has multiple models, but the "flipped-classroom" is considered the most popular and most successful in a traditional classroom environment [Thai, De Wever and Valcke, 2017]. This model "flips" the classroom dynamic, making the learners the primary acquirers of knowledge and not reliant on the educators for knowledge. These models do not have to be used in isolation, and different aspects from models can be combined to complement teaching and learning activities both in the classroom and for distance learning [Kaur, 2013]. The use of blended learning places extra pressure on educators as they are expected to evolve their pedagogical knowledge and educational practices by providing technology-enhanced, asynchronous, online learning options [McKnight et al., 2016; Nazarenko, 2015], which could influence their willingness to use technology for teaching and learning activities [Nazarenko, 2015].

COP

Numerous studies in South Africa have highlighted the need for training and skills development amongst educators. These studies have highlighted that training needs to be more than technological training but should also include training on integrating technology into educators' pedagogical practices. One mechanism which could promote continuous learning of educators is through a Community of Practice (COP).

A COP can be defined as "a group of people who share an interest in a domain of human endeavour and engage in the process of collective learning that creates bonds between them" [Wenger, 2002]. They can also be defined as self-organising, informal learning systems where learning takes place through interaction, discussions, and sharing of knowledge [Gray, 2004]. COPs are important for educators as they are a space where they can learn from fellow educators and develop best practices that can be used to improve their own teaching practices [Trust and Horrocks, 2017]. COPs bring together educators of differing expertise to share their knowledge and learn from one another [Lave and Wenger, 1991], providing professional development through ongoing learning experiences [Brooks, 2010]. COPs generally take time to develop but can be promoted through encouragement and support from stakeholders [Goodyear and Casey, 2015].

TPACK

The skill-level of the educator needs to be considered when technology is introduced for teaching and learning activities. As discussed previously, differential capacity plays a role in educators adopting and using technology for teaching and learning. There is also often a lack of educator training, both technological and pedagogical, to ensure educators have the necessary skills to use technology effectively. The Technological, Pedagogical, and Content Knowledge (TPACK) Framework highlights that an educator who can teach with technology is someone who possesses:

- Pedagogical knowledge, the knowledge of how to teach;
- Content knowledge, the knowledge of what to teach; and
- Technological knowledge, the knowledge of how to use technology [Koehler and Mishra, 2009].

Koehler and Mishra [2009] and Mishra [2019] argue that effective teaching with technology takes place at the intersection of all three of these knowledge areas, as shown in Figure 1. An educator's Technological Pedagogical Knowledge (TPK) impacts their ability to use technology effectively for teaching and learning activities. Educators often have the necessary pedagogical knowledge and often have some technological knowledge, but there is often no training on how to integrate these knowledge areas to ensure effective teaching with technology. This can be seen in both South African studies [Herselman and Botha, 2014; Hart and Laher, 2015; Msila, 2015; Nkula and Krauss, 2014] and in international studies [Drent and Meelissen, 2008; Maina et al., 2015; Pamuk et al., 2013; Wastiau et al., 2013]. Studies conducted in South Africa that specifically focused on TPACK development showed that educators often lack the necessary technological knowledge to ensure integration of technology into pedagogical practices [Hernawati and Jailani, 2019; Mdingi and Chigona, 2021]. As such, it is important that training and continuous development should include more than just technological training but should also focus on the integration of pedagogical knowledge and technological knowledge.
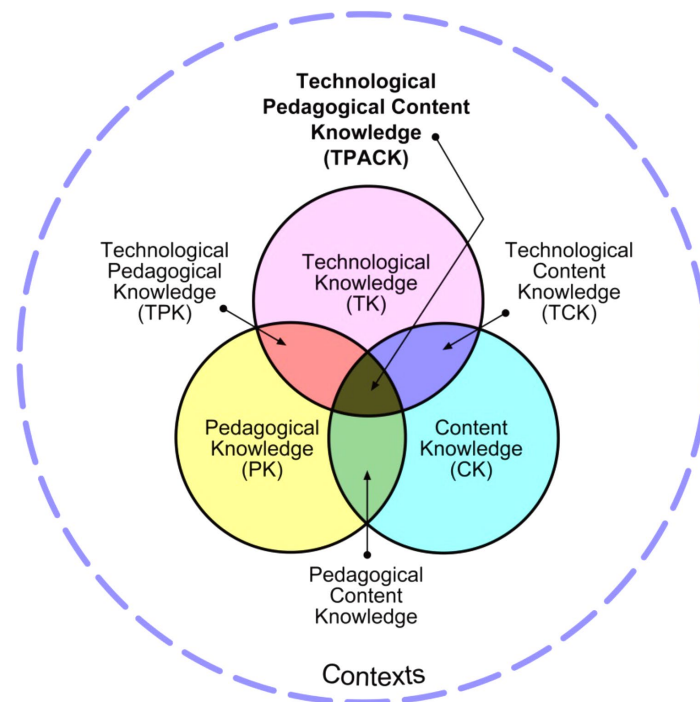
Figure 1: TPACK [Koehler and Mishra, 2009]

UTAUT

An educator's motivation, as discussed previously, also affects their willingness to adopt and use technology for teaching and learning activities. As such, it is important to understand what aspects influence an educator's technology acceptance. Technology acceptance amongst educators is multi-faceted and it is important to understand how an educator's knowledge, intention, and context affects their technology acceptance [Scherer, Siddiq and Tondeur, 2019]. The Unified Theory of Acceptance and Use of Technology (UTAUT) [Venkatesh et al., 2003] was constructed to produce a more holistic view of technology acceptance [Testa and Tawfik, 2017] and comprises four aspects that need to be considered for technology acceptance, namely:

- Performance expectancy, how much the person perceives technology will improve their work performance,
- Effort expectancy, how easy the person thinks the technology is to use,
- Social influence, the person's perceptions of outside pressure for the use of technology,
- And facilitating conditions, a person's perceptions of resources and support available to aid technology use [Attuquayefio and Addo, 2014].

These four aspects (Figure 2) provide an understanding of an individual's ability to use technology and the contextual factors that may influence their adoption and use of technology. This model is important, especially in areas with poor infrastructure and limited access to resources such as connectivity, where contextual factors outside of an individual's control directly influence their technology use [Mosunmola et al., 2018].
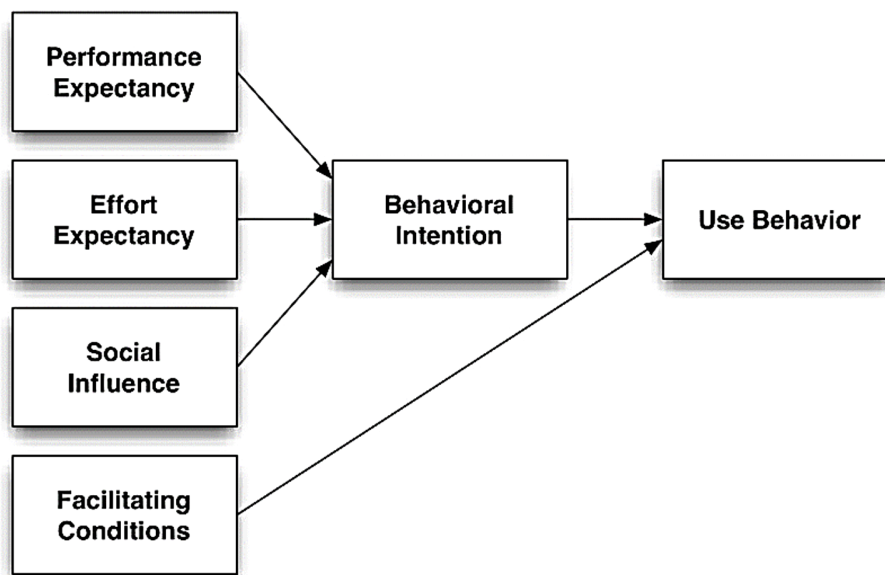
Figure 2: Unified Theory of Acceptance and Use of Technology [Venkatesh et al., 2003]

III) METHODOLOGY

This section describes the research methodology and processes that took place to complete this research. Firstly, the research process followed is described. Secondly, the research strategy and participants are discussed and finally, the data collection process is detailed.

ADR

This study used Action Design Research (ADR) as the research procedure. ADR focuses not only on building a solution but enabling the organisational context to affect the solution. ADR attempts to combine design elements and contextual factors to produce context-specific solutions to given problems within an organisation [Sein et al., 2011]. It is an important research process when dealing with socio-technical problems where the focus is on providing a technical solution and reducing some of the external social problems faced by an organisation [Bilandzic and Venable, 2011].

Research Strategy and Participants

This study investigated a single case study. Case studies are used when a phenomenon needs to be studied in its natural context to understand the unique dynamics of the problem [Darke, Shanks and Broadbent, 1998]. This enables researchers to gain an understanding of the complexities within a given situation and how to influence those complexities [Mueller and Urbach, 2017]. Case studies are important where people and actions need to be understood when solving a problem [Darke, Shanks and Broadbent, 1998]. This makes case studies a good choice for ADR research which focuses on producing context-specific solutions.

The participants in this study were drawn from a secondary (high), previously disadvantaged school (School X) in Makhanda, Eastern Cape, South Africa using purposive sampling. Previously disadvantaged schools are poor, government schools that have been disadvantaged from their time as former Department of Education schools during the Apartheid era in South Africa. They are typified as having poor infrastructure, poor sanitation, and unkempt premises [Xaba and Malindi, 2010]. Although these features are true for many schools, previously disadvantaged schools can still function and provide quality education [Xaba and Malindi, 2010]. This is true for School X which can be referred

to as a functioning previously disadvantaged school as the school continues to provide quality education despite the challenges faced. The case study included three educators from School X. The educators were chosen using purposive sampling as this study required educators with some technological knowledge prior to the introduction of the Tablet PCs.

During initial questionnaires completed by the educator participants, knowledge was gained on their technological knowledge and willingness to adopt and use technology for teaching and learning. Based on the questionnaires, the educator participants found technology relatively easy to learn but did not feel they had sufficient knowledge to integrate technology into their pedagogical practices. The educators also felt that technology was not always helpful in the classroom or did not always improve efficacy of teaching.

Data Collection

Educators' use of technology is multi-faceted, and their skill level, instructional actions, interactions with learners, and reflections of their own actions need to be considered [Harris, Grandgenett and Hofer, 2012]. As such, semi-structured interviews were used to understand the educator participants' views on technology in the classroom and for distance learning. These interviews provided insight into the educator participants' attitudes towards using technology in the classroom and for distance learning. The initial semi-structured interview questions can be found in Appendix I.

The interviews were analysed using Thematic Analysis (TA). TA is one of the most common ways of analysing qualitative data. It is a method of analysing content and identifying common themes within that data [Castleberry and Nolen, 2018]. Both Top-Down and Bottom-Up TA were conducted on the transcribed interviews. Top-Down analysis focused on looking for theoretical themes present in the data and used them to understand how existing theory plays a role in educators' use of technology for teaching and learning activities. The theory used to determine the themes during Top-Down analysis were TPACK, UTAUT, Blended Learning, and COP. Bottom-Up analysis focused on themes that did not exist in theory but that emerged as important themes raised by the research participants. The themes found during the Bottom-Up analysis included the Impact of Covid-19, the need for connectivity, and the need for support. These themes are discussed in the findings section.

IV) FINDINGS

This section describes the results of the interviews held with the educator participants during the study. This section focuses on how the Covid-19 pandemic impacted teaching and learning within a previously disadvantaged government school in South Africa, the need for technology for teaching and learning, and the need for educator training/continuous development to ensure that technology be used effectively.

Impact of Covid-19

Due to the coronavirus pandemic, the educator participants highlighted that classroom time had decreased significantly as a result of having to apply social distancing measures within classrooms. This had led to learners not being allowed to attend school regularly and educators having to find new ways to continue teaching and learning activities while learners were physically away from school. This led to time management issues amongst the educator participants as they had to create new online learning materials for their learners in a hurry.

The provision of devices was considered a necessary step by the educators to ensure the continuation of learning during the Covid-19 pandemic. Unfortunately, these devices were supplied with a limited about of mobile data (for accessing the Internet), and as such, learners had limited connectivity. This limited connectivity reduced the learner's ability to interact with their educators, fellow learners, and with the learning material provided by the educators. This lack of connectivity also reduced their ability to participate in online and making synchronous, online learning almost impossible. The educators highlighted that

many of the learners at School X were unable to purchase additional data due to personal financial constraints. The resulting lack of connectivity affected their ability to communicate with their educators and peers and receive learning materials. As such, the educators highlighted that a lack of mobile data would always be the greatest "handbrake" when introducing technology into education for teaching and learning activities especially in previously disadvantaged schools where learners typically come from low socio-economic backgrounds.

Need for training and support

The educator participants commented that many of the educators in School X lacked the necessary technological and pedagogical skills to use technology effectively. As a result, many educators feeling demotivated and unwilling to use technology for teaching and learning activities. This highlighted the need for training for educators to be provided alongside the provision of devices (to both educators and learners) to ensure that educators are willing and able to use technology for teaching and learning activities. The educator participants also highlighted that although some had the technological knowledge to use the devices, they struggled to integrate the devices into their pedagogical practices. Therefore, educators also highlighted the need for pedagogical changes to take place due to the need for the use of Tablet PCs for teaching and learning both in the classroom and for distance/remote education.

The educator participants also noted the need for a COP to help educators share their knowledge and improve their pedagogical practices while using technology. They highlighted that everyone in the COP needed to have sufficient technological knowledge as a starting point to promote continued development. The educators also commented on the need for support, specifically from the Department of Basic Education (DBE). This support, they highlighted, should be through the provision of training and continuous development for educators, the provision of online learning materials that could be used as templates, and promoting the creation and longevity of COPs amongst educators. COPs would also support educators and provide safe learning environments for educators to learn to teach with technology.

V) DISCUSSION

This section highlights the struggles educators had when introducing Tablet PCs into teaching and learning activities during the Covid-19 pandemic. This section draws on the theory discussed in section II and the results in section IV in an attempt to provide practical recommendations that should be considered when Tablet PCs are being introduced into previously disadvantaged government schools in South Africa and specifically for when they are being used for distance learning. These factors include the provision of data, the provision of educator training (continuous development), and the creation and sustaining of COPs.

Provision of Data

The introduction of Tablet PCs into education is said to improve the continuation of learning as learners have access to a greater body of knowledge through access to the Internet and other learning materials provided by the school and stored on the device [Hwang, Lai and Wang, 2015]. As discussed previously, the provision of devices was necessary to ensure that learning could continue despite the reduced class time because of the Covid-19 pandemic. As a result, the introduction of Tablet PCs became more urgent, and they were introduced to the Grade 12 learners in School X to ensure the continuation of learning of final year learners.

The Tablet PCs provided to School X came with a limited mobile data package/bundle. As such, the learners depleted their data bundles quickly and were unable to purchase additional data for personal financial reasons. This reduced their ability to connect with their peers and educators using the newly acquired ICTs and constrained their opportunities to learn while away from school.

The need for connectivity within education should be considered a vital component of education [Cornu, 2004]. Society has become more connected due to the introduction of the Internet and ICTs. This should have an impact on education by creating new ways of acquiring and disseminating knowledge. The introduction of the Internet and ICTs into education also changes how educators and learners communicate and acquire knowledge, thus creating a new form of collective intelligence. Therefore, a lack of connectivity could hinder learning by reducing communication between remote learners and educators and reducing access to the collective intelligence developed inside the classroom environment. Therefore, data provision cannot be a once-off intervention and data bundles/packages need to be supplied monthly to ensure continued connectivity. Consequently, data provision would be an ongoing expense for the DBE to ensure learners and educators remain connected during distance and online learning.

Provision of Training

Training needs to accompany the provision of Tablet PCs to ensure educators can use technology effectively in the classroom. A lack of professional development is one of the biggest barriers to adoption of technology for teaching and learning activities in South Africa as educators often lack the skills needed to effectively use technology in the classroom or for distance learning [Adukaite, van Zyl and Cantoni, 2016; Hart and Laher, 2015; Herselman and Botha, 2014; Lupondwana and Coleman, 2019; Nkula and Krauss, 2014]. The lack of professional development also reduces the motivation of educators to use technology for teaching and learning, further reducing adoption amongst educators [Batchelor and Olakanmi, 2015; Bladergroen et al., 2012].

As such, this section highlights the need for training required by educators to ensure the effective use of technology for teaching and learning. The need for training was expressed as a need for both technological training and pedagogical changes to ensure effective use of the Tablet PCs for teaching and learning activities.

Technological Training

The TPACK framework states that an educator can only use technology effectively for teaching and learning if all three knowledge areas of the educator are fully developed. Meaning that an educator cannot teach effectively with technology if they do not have the knowledge of how to use that technology. A lack of technology acceptance (as discussed in the UTAUT model) affects educators' willingness and motivation to use technology for teaching and learning [Hart and Laher, 2015; Howley, Wood and Hough, 2011]. This lack of motivation is also an amplifier of existing institutional forces and reduces the educator's willingness to adopt and use technology in the classroom and for distance learning. The current Covid-19 pandemic is creating an external source of motivation for educators to use technology. Educators are also being affected by social influence, as principals and the DBE are expecting educators to continue teaching even when learners are away from school. Although the educators are now expected to use technology, they still lack the technological knowledge to do so. As such, educators' technological knowledge needs to be developed to ensure effective use of technology for teaching and learning.

This lack of technological training has been highlighted by other South African studies and was highlighted by the educator participants in this study. They also commented on the lack of training provided by the DBE, which they noted would reduce some of the anxiety they and their colleagues experienced when confronted with new technology. Consequently, the educators suggested that training should be ongoing and be provided during an educator's university education.

This training should increase educator motivation to accept and use technology in the classroom, as technology can only amplify the pedagogy of an educator who is motivated to use technology in the classroom and for distance learning [DiMaria, 2016]. Technological training should include aspects on how to use the Tablet PCs and should reduce the anxiety experienced with using new technologies. Training also reduces the effort expectancy of educators [Attuquayefio and Addo, 2014], discussed in section II, enabling educators to use technology more easily. Appropriate training could also potentially ensure that all three knowledge areas of TPACK would be more fully developed,

thereby promoting technology integration into an educator's pedagogical practices. The educator participants also highlighted that technological training could be assisted by an educator-driven COP to develop the educators' technological knowledge through task-driven exercises in a continuous development process.

Pedagogical Changes

Technological training increases the motivation for educators to use technology in the classroom and for distance learning, but pedagogical changes need to take place for the effective use of technology for teaching and learning. The TPACK framework refers to the integration of pedagogical and technological knowledge as technological pedagogical knowledge, which are the pedagogical changes that should occur when technology is introduced into teaching and learning activities. Educators often struggle to integrate these knowledge areas [Hart and Laher, 2015; Maina et al., 2015; Msila, 2015] as effective integration can only occur if both knowledge areas are fully developed. As such, pedagogical training needs to include how to integrate Tablet PCs into teaching and learning activities to ensure the effective use of Tablet PCs for classroom and distance learning [Adu and Galloway, 2015].

The introduction of Tablet PCs should change the pedagogical practices of the educator. Due to the Covid-19 pandemic and decreased class time, the educators had to change their pedagogical practices to ensure they could continue teaching during the lockdowns and subsequent decreased classroom time. As such, the need for a distance and asynchronous learning became more apparent and thus a blended approach to teaching and learning needed to be adopted. The introduction of blended learning does place extra pressure on educators as they have to evolve their pedagogical practices [McKnight et al., 2016; Nazarenko, 2015] and this may affect educators' effort expectancy.

An increased effort expectancy can decrease the motivation of educators to use technology for teaching and learning. This was further exasperated by a lack of connectivity for learners which severely hindered online, synchronous learning. A change to pedagogical practices takes time and support from relevant stakeholders such as school principals, the DBE, and other educators (colleagues) would provide positive social influence and improve the motivation of educators to use technology for teaching and learning. A COP was also highlighted as an example of positive social influence to provide support and continuous development for educators.

Creation of a COP

A COP can be used to promote the continuous development of educators, improve pedagogical practices [Brooks, 2010; Trust and Horrocks, 2017], and provide support in working towards the effective use of technology in the classroom and for distance learning.

Continuous development is accomplished through problem-solving, sharing knowledge, and determining best practices for teaching with technology [Trust and Horrocks, 2017]. As such, a COP can improve the technological and pedagogical knowledge of an educator, detailed in the TPACK framework, by enabling them to share their experiences of using technology in the classroom and for distance learning [Admiraal et al., 2017; Alemdag, Cevikbas and Baran, 2019]. Continuous development improves an educator's capacity to use technology and therefore should increase their motivation to use technology. COPs also create a support network where educators can share their knowledge with people of similar knowledge and backgrounds [Goodyear and Casey, 2015]. This support structure has the potential to provide positive social influence and improve the motivation of educators to use technology. Both support and social influence are considered aspects of technology acceptance in UTAUT. Unsurprisingly, a functioning COP was described by the participating educators in this study as an important aspect of learning to use technology for teaching and learning.

COPs take time to develop and require individuals of similar knowledge areas to share connected practices [Goodyear and Casey, 2015]. Therefore, the necessary technological training for educators should be provided to all educators to ensure that everyone in the COP has a similar knowledge base. The development of COPs should be encouraged and

supported by individuals, such as school principals and fellow educators, as well as the DBE, ensuring continuous development is promoted and supported among educators.

VI) CONCLUSION

This section presents the concluding arguments for this research paper. Firstly, the practical recommendations that schools, and the DBE could consider when introducing Tablet PCs into education in previously disadvantaged government schools in South Africa, especially during the Covid-19 pandemic will be discussed. A summary of the themes, findings, and recommendations can be found in Appendix II. Secondly, the limitations of this study will be highlighted.

Practical Recommendations

This section aims to highlight the practical recommendations for schools and the DBE when Tablet PCs are being introduced for teaching and learning activities. These practical recommendations include connectivity, training, and COPs. The introduction of Tablet PCs has highlighted that educators often feel ill-prepared and often unwilling to use Tablet PCs for classroom and distance learning. The introduction of Tablet PCs has been hastened by the Covid-19 pandemic which has placed further pressure on educators to change their pedagogical practices and embrace distance and online learning.

Connectivity

The change to distance and online learning has highlighted the need for continuous, ubiquitous connectivity amongst learners and educators and the need for continued provision of mobile data packages/bundles to ensure continued connectivity. This should promote continuation of learning as learners and educators can extend the classroom learning environment into the online/virtual learning environment.

Training

The introduction of Tablet PCs has highlighted the need for technological training and pedagogical changes to take place to ensure that educators can teach effectively with technology. The lack of technological knowledge was highlighted by the educator participants in this study and is a common barrier for adoption of technology across South Africa. The training required by educators should include aspects on how to use the Tablet PCs to ensure that educators have the starting knowledge to begin integrating Tablet PCs into their pedagogical practices. Once technological training is completed the educators need to be supported to ensure they can integrate the Tablet PCs into their pedagogical practices as effective teaching with technology takes place at the intersection between technological and pedagogical knowledge. This change to pedagogical practices takes time and needs to be supported by principals, the DBE, and fellow educators.

COPs

The introduction of Tablet PCs has shown that educators need to be provided with continuous development to ensure that technology is accepted and used for teaching and learning activities. Continuous development can be provided through the creation of a COP. A COP can provide positive social influence and offer support to educators to improve technology acceptance. A COP can be educator-driven but should be supported by principals, and the DBE to ensure that continuous development is encouraged and supported among educators.

Limitations

This study involved a relatively small sample size of three educators. This sample size affects the generalisability of the findings, but the practical considerations presented can still provide some insight into how previously disadvantaged schools can prepare for the introduction of Tablet PCs into teaching and learning activities.

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APPENDIX I. INITIAL SEMI-STRUCTURED INTERVIEW QUESTIONS

1. How have you found using the Tablet PCs in the classroom and for distance learning?

2. Do you feel that the use of Tablet PCs has been successful so far?

    a. What do you think are some of the benefits of using the Tablet PCs?

    b. What are some of the drawbacks of using the Tablet PCs?

    c. Do you feel that they allow for the continuation of learning?

3. How has the use of the Tablet PCs and having to change to distance learning affected the way you teach?

4. With the Department of Basic Education provided Tablet PCs, what are some of the expectations that the DBE has when using the Tablet PCs?

    a. Have the expectations been realised or been provided for?

5. How have you been sharing resources with your classes?

    a. How have the learners responded to learning online alongside classroom interaction?

b. What are the disadvantages of sharing information with learners online?

6. Have there been any technical issues around using the Tablet PCs for you or your learners?

    a. Have you been able to mitigate the issues?

7. Do you feel that there is any more training that you would like to be able to better use Tablet PCs for in class and distance learning?

8. What do you feel needs to be in place, or provided to support teachers in integrating the use of tablet PCs meaningfully into teaching and learning activities?

APPENDIX II. SUMMARY OF THEMES, FINDINGS, AND RECOMMENDATIONS

Table 1: Summary of Themes, Findings, and Recommendations

Summary of Themes, Findings, and Recommendations		
Themes	Findings	Recommendations
Provision of Data	The data provided to the learners in School X during the duration of this study was limited and was not continuous. This led to the learners depleting the data they had been provided and being unable to replace it once it was finished. This hindered the learner's ability to communicate with their educators and with their fellow learners. This resulted in learners being unable to access valuable resources and making online, synchronous learning a struggle for educators and learners.	Distance and online learning have led to the need for continuous, ubiquitous connectivity for all learners. As such, the provision of mobile data/bundles needs to be continuous to ensure that learners can access learning materials and communicate with their educators. This continuous provision of data should help the continuation of learning during online and distance learning.
Provision of Training	The educator participants highlighted that many of the educators in School X have limited technological knowledge and were unable to use technology effectively in the classroom. They highlighted that training needed to be provided alongside the introduction of Tablet PCs to ensure that educators are willing and able to use the Tablet PCs effectively for teaching and learning activities. The training provided needed to include both technological training and training on how to integrate Tablet PCs into their pedagogical practices.	The introduction of Tablet PCs has highlighted the need for technological training to ensure educators can use Tablet PCs effectively for teaching and learning activities. The training required by educators should include aspects on how to use the Tablet PCs. Once technological training has taken place, educators need to be supported to ensure they are able to integrate the Tablet PCs into their pedagogical practices. This change to pedagogical practices takes time and needs to be supported by principals, the DBE, and fellow educators.
Creation of a COP	The educator participants highlighted the need for the creation of a COP where educators could share their knowledge and promote the changes to their pedagogical practices. The educator	COPs provide a space for educators where continuous development is promoted and supported. The creation of a COP provides positive social influence for the educators and provides a support

	participants commented on the need for everyone in the COP to have a similar knowledge base and therefore technological training should take place prior to the creation of the COP.	network that could promote technology acceptance amongst the educators. A COP can be educator-driven, but the creation of COPs should be promoted and supported by the DBE and principals to encourage continuous development among educators.