

## The Exigency of ICT Resources on Teaching and Learning in South African Primary Schools

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### Abstract

The transformative implications of Information and Communication Technology (ICT) on the teaching and learning fraternity has necessitated its integration in the classroom, globally. Nevertheless, it is important to note that the quest for integration in individual school contexts remains an uphill task despite ICT integration being a policy prerogative in a number of countries. This survey has the sole objective of unpacking how the teaching and learning process has been affected due to lack of ICT resources. By use of a simple questionnaire, the researcher made use of semi-structured interviews in order to solicit data from educators in selected South African primary schools. The interviews were transcribed manually and coded. The data analysis process was conducted by use of a thematic mode of analysis. The findings demonstrated that, due to several reasons, many schools do not make use of ICT tools in teaching and learning, as expected, and in most cases, they do not maximise the use of the existing resources, thus affecting the teaching and learning processes. The researcher recommends that the South African Department of Basic Education (DBE) seriously take into consideration individual school contexts when allocating ICT resources in order to try and mitigate the challenges. Stepping up monitoring and evaluation mechanisms that currently exist will help identify contextual challenges and help with providing assistance where necessary. Security issues also call for schools to team up with local communities to try and fight the theft and vandalism of IT resources. All these measures are meant to facilitate the preservation and use of ICT resources in the classroom for the improvement of the learning process.

**Keywords:** Primary education; ICT integration; information and communication technology; teaching and learning

### Introduction

The technicalities that relate to the integration of information and communication technology (ICT) in classrooms on a global scale have culminated in different views and opinions on how to address this phenomenon from the perspective of schools. It is crucial to establish the level of success schools have been able to reach when it comes to the integration of ICT in the teaching and learning process. Consideration of the school context has become one of these approaches to ICT integration. The reason behind such an approach is that a number of schools have unique and context-based challenges that cannot be related to any other school thus the need to contextualise their challenges and solutions. In this respect, Rabah (2015:24) pointed out that "it would be inappropriate to view ICT-based education without taking into consideration the school's context, setting, and environment," since such factors have different implications. Research carried out on ICT integration in teaching and learning in Hong Kong identified possible contextual challenges (Yuen, Law, & Wong, 2003). Among these are value systems; innovation processes; commitment and support by teachers, and professional development of teachers. At the same time, Karunaratne, Peiris, and Hansson (2018) asserted that a lack of sufficient resources

has become a serious hindrance to the full and maximum usage of ICT in some classrooms.

When we speak of context-specific ICT integration, this refers firstly to the national educational system in a particular country. As such, this study focuses on in South Africa, which has nine provinces (Padayachee, 2017; Msila, 2015; Ndlovu & Lawrence, 2012). Another context is that of language-based education, where South Africa has eleven spoken official languages (Filita & Jita, 2021). Furthermore, a distinction is made between urban and rural school contexts, and socio-economic advantaged versus disadvantaged schools (Mlambo et. al., 2020; Mwapwele et. al., 2019; Ojo & Adu, 2018). Empirical research is required for all contexts, as there cannot be a one-size fits all approach to education in general and ICT specifically.

More than a decade ago, various context-specific studies on ICT had begun to emerge to assess the level of technological adoption in South African schools. Ndlovu and Lawrence (2012) evaluated the quality of ICT use in South African classrooms, given the government imperative to use modern technology to redress past educational inequalities. When they assessed the progress of ICT integration then, they found that teachers were merely using ICT tools to transmit subject content, and had not yet used them in pedagogy that enhances learning and higher order thinking skills (Ndlovu and Lawrence, 2012:1). A major consequence of the insufficient adoption of ICTs in pedagogy that was identified was the missed opportunity to enhance learner performance. The authors drew on the following six broad conditions from Haddad (2007) for the effective use of ICTs:

1. What subject outcomes do we want to achieve?
2. What technologies can help best achieve the outcomes?
3. What technologies are we talking about or do we have?
4. To what use are we putting ICTs in the advancement of learning?
5. Is the potential of ICTs properly exploited?
6. Are the conditions for ICT effectiveness met? (the effectiveness can be measured by the quality of learner performance in each subject area) (Haddad, 2007:5 in Ndlovu and Lawrence, 2012:21-22).

They argue that these conditions are able to override the circumstances that the user (teacher) finds themselves within, even in disadvantaged schools. However, five years later Padayachee (2017:36) provided a “snapshot survey of ICT integration” in South African schools, where she subsequently argued that ICT integration in the classroom is not “a panacea towards resolving South Africa’s education challenges.” The shortfalls of ICT integration are largely due to operational, strategic and pedagogic challenges. These challenges pertain to misunderstanding the contextual nature of the South African school landscape. Thus, research is required to understand how ICT is practically adopted and enforced in the classroom, within its own context.

Padayachee (2017:42) contributed to this research endeavour through a qualitative and quantitative data study of selected high achieving schools in the Tshwane South District of the Gauteng province. The study found that: “the uptake of technology remains low, on average the frequency of usage per tool type was as follows: contextual tools (41%), sharing information and ideas tools (29%), experiential tools (26%) and reflective dialogue tools (18%)” (Padayachee, 2017:57). Moreover, teachers were uncertain about the enforcement of e-education, in the context of poor infrastructure and lack of skills (Padayachee 2017:57). This study coheres with the position in this paper that ICT integration should be approached with an appreciation of the school’s context, setting, and environment.

A more current study of the status of ICT integration in South African schools by Mnisi, Mtshali and Moses (2024), once again provides an evaluation of the initiative. Its particular context, in this instance, was the Tshwane West District schools in Gauteng Province, where 10 teachers and one curriculum specialist were interviewed and filled questionnaires. The study revealed that while relevant policies existed, and most of the studied schools had adopted the use of some ICT tools, insufficient internet coverage in the classroom prevented the use of laptops, whiteboards, and online videos (Mnisi et al., 2024:128). In other words, ICT integration was progressing, however the lack of internet connectivity or its intermittent interruption hampered the process. The authors recommended the installation of pocket Wi-Fi devices in every classroom to promote digitally viable learning environments that facilitate teaching and learning through up-to-date learning management systems (Mnisi et.al 2024:133).

As mentioned earlier, language is also a contextual issue that has a bearing on ICT integration. Specifically, Filita and Jita (2021) examine the perspectives of secondary school teachers on the use of ICT to teach a South African language that is not English. Sesotho language teachers in selected schools from grades (2, 6, 8, and 10), and representing a different quintile (from 1 to 4), participated in semi-structured interviews; and the Technological Pedagogical Content Knowledge (TPACK) framework was used to guide the study (Filita & Jita, 2021:226). There were three main findings from the study: the lack of Sesotho content on ICT resources affects the adoption of ICT in the teaching and learning of Sesotho; in general, teachers in the district studied lacked technological knowledge (TK); teachers also lacked knowledge of ICT policies; and for those teachers who showed evidence of ICT use, they attempted to use those tools available in their schools to ensure that teaching does not solely depend on traditional methods (Filita & Jita 2021: 219).

These findings firstly demonstrate the crucial need for ICT-based resources in all languages that are spoken and taught in South African schools. Secondly, while there may be teachers who take initiative to integrate ICT and use it to complement traditional teaching methods, twenty years after the DoE's policy on ICT (2024) was developed, it appears that teachers still avoid or circumvent ICT technology tools. Studies have been conducted on this phenomenon of teacher's evasive attitudes, perspectives and influences towards ICT use and integration (Nkula & Krauss, 2014; Padayachee, 2016; Ntsobi 2022).

There is, however, consensus that that the usage of ICT in teaching and learning has the ability to improve learner achievement, moreso in areas where people are of low socio-economic status, who cannot afford to send their children to better schools (Rasool & Naidoo, 2024; Nhlapo et. al., 2024; Maja, 2023; and Khan, 2020). This necessitates empirical studies that will help provide a national perspective of the effects the lack of ICT resources has had on teaching and learning, especially in remote and poorly developed areas. Thus, this research endeavours to explore the reasons for, and consequences of the lack of ICT resources on teaching and learning in selected South African primary schools.

## Literature Review

### *Research context*

In order to obtain a better analysis of the nature of ICT integration in classrooms throughout South Africa, it is of paramount importance that we comprehend the "events, activities, contents, and interpersonal processes taking place in the context that ICT is used" (Lim, 2002:411). The Department of Education (DBE) classifies the schools selected for this survey as quintile 1 (no-fee) schools in the Western Cape province. Such schools are beneficiaries of the same government support and have the same catchment area. This categorisation stems from the National Norms and Standards for School Funding (NNSFF) policy, whose objective is to guarantee equity and redress of imbalances created by the apartheid era, in all aspects which include education (DBE, 2011).

It is important to note that the Department of Education in South Africa existed until 2009 before it was split into the Department of Higher Education and the Department of Basic Education. Due to the stumbling blocks that work against efforts to achieve equity, schools in socially and economically disadvantaged communities continue to play second fiddle regarding resource availability, including ICT. Mirzajani, Mahmud, Ayub, and Wong (2016) pointed out that in such circumstances, the chances of teachers getting demotivated are high. Thus, this research intends to answer the following questions:

1. What is the importance of ICT resources on teaching and learning in primary schools?
2. What effect does the lack of ICT resources have on teaching and learning in primary schools?

### *ICT integration in South Africa: A retrospect*

Over the past 20 years, South Africa has tried consistently to harness efforts and resources towards the attainment of a paperless classroom, and to expose learners to better and unlimited learning opportunities that encompass engaged learning environments. As a result, South Africa's ICT mission has been blended into the country's National Development Plan 2030 (Mjwara, 2017). In 2003, the Department of Education (DoE), being aware of the merits of ICTs for learners, for the first time dedicated itself to ensuring that every individual learner in South Africa be given access to ICT resources, and is technologically literate by the year 2013 (DoE, 2003:17). This

commitment created a platform for a number of engagements to implement ICT integration across South Africa. The Gauteng Provincial education department, for example, readily endorsed and welcomed the ICT-integration initiative, aiming to facilitate simpler and more enjoyable learning for every learner through the provision of ICT tools (Odendaal, 2017). This dedication was shown against the backdrop that integrating technology in the classroom has the ability to alter the negativity related to the South African education system (Rabana & Martin, 2017).

Denoon-Stevens and Ramaila (2018) asserted that the prevalence of ICT facilities, moreso in poor communities, has the ability to develop social capital and empower individuals and the community, a notion subscribed to by Ismail, Jomezai, and Baloch (2020). Nevertheless, achieving that possibility looks elusive, given the fact that schools like the ones considered in the current research are perpetually deprived of ICT resources, and the Minister of Basic Education regards this as a problem the further compromises the learning process (Maromo, 2020; Mbuza, 2020).

The 2013-2025 e-Education strategy of the DBE is a policy directive that steers the achievement of the country's ICT-integration plan (DBE, 2014). The implementation strategy of this roadmap came with well defined roles and responsibilities for the relevant stakeholders that include provincial education departments (DBE, 2014). The feedback provided by the DBE in February 2018 on how this plan was progressing, outlined how it had successfully connected 16,102 schools at national level with basic ICT resources, out of which 1,951 were rolled out in the Western Cape province (Parliament of the Republic of South Africa, 2018). However, these numbers should be viewed against the backdrop of the total number of schools in 2022, which were approximately 24,900, with the majority (22 589) being public schools, and in contrast 2,282 are independent schools (Cowling, 2024). Gauteng and Western Cape hosts the majority of independent schools at 935 and 302 schools, respectively (Cowling, 2024). These schools accommodated 13 439 683 learners, serviced by 454 749 educators (School Realities, 2023). This demonstrates that ICT penetration and integration still has a long way to go.

A synopsis of several ICT integration across provincial and socio-economic contexts helps to identify the nature of common and unique challenges. In the Eastern Cape province, a study (Ojo & Adu, 2018) was conducted on the availability and utilisation of ICT facilities, with 450 student and 150 teacher participants. It was found that only mobile phones were used by students "to download relevant information on their various courses and exchange ideas and knowledge among other students" (Ojo & Adu 2018:1). In light of this basic use of ICT, it was recommended that the DBE should provide more funding to train and re-train teachers to more effectively use ICT for pedagogy, and there should be better monitoring and evaluation of the process (Ojo & Adu 2018:9).

Mathipa and Mukhari's (2014) study focused on urban schools in Gauteng province, and specifically the role of teachers in the implementation of imperatives from the National ICT Education Policy, towards "producing produce ICT capable learners who will be able to use ICTs for knowledge creation and knowledge sharing, social development and economic growth" (Mathipa & Mukhari, 2014: 1213). The authors isolated several factors that impede ICT integration, namely: "insufficient number of computers and lack of application programs, teacher generation gap, inadequate teacher training, lack of ICT skill and lack of confidence, teachers' beliefs, poor school leadership and lack of public support" (Mathipa & Mukhari 2014: 1218). In light of the findings, it was recommended that training for all teachers must be prioritised by the DBE; teachers should collaborate and consult ICT competent teachers for help; online teacher development and support communities should be introduced; and teachers should appreciate that new ICT can be used as methodological resources (Mathipa & Mukhari 2014: 1219).

A more recent study (Dlamini, 2022) also in Gauteng investigated factors constraining ICT integration of schools, and was a provincial government initiative to assess education practices using digital technologies. One of the objectives was to understand why some teachers actively integrate ICTs and others do not. From questionnaires answered by 837 respondents, data was analysed using descriptive statistics and Pearson correlation analysis. The findings revealed that teachers demonstrated limited technical pedagogical knowledge and limited experience in integrating computers in classrooms (Dlamini 2022:28). In concert with this study, it was also found that "context is key" in terms of how ICT can be integrated in the classroom, and Dlamini (2022:32) maintains in this respect that "context is another reason why ICT initiatives collapse, since the educational benefits of ICTs are not automatic." In addition to echoing

similar recommendations by some of the above mentioned studies (Maromo, 2020; Mbuza, 2020; Ojo & Adu 2018; Denoon-Stevens & Ramaila, 2018; Mathipa & Mukhari, 2014); Dlamini (2022:39) proposed that an in-depth systematic longitudinal study should be undertaken to better understand the impact of ICT on teaching and learning.

Whereas it is not a given that rural schools are also disadvantaged, in the South African context it is usually the case. The underdevelopment of the school usually also correlates with under-trained teachers. Zenda and Dlamini (2023) thus found that rural teachers seemed unclear about how to use ICT to facilitate educational practice. Their quantitative study revealed that teachers in this context need to develop ICT fluency, receive relevant policy-based training, as well as the appropriate ICT infrastructure (Zenda & Dlamini, 2023:815). Furthermore, ICT enables a shift from teacher-centred to student-centred teaching and learning to generate increased participation and improved learner outcomes.

The context of previously disadvantaged schools, even in urban areas, appears to be similar to that in rural schools. Considering the "Classroom of the Future" programme initiated by the Gauteng province in 2015, several disadvantaged schools were selected to participate. Rasool and Naidoo (2024) subsequently studied the sustainability of ICT use in six of the schools. They found that the teacher professional development pertaining to ICT was ineffective and inadequate; service delivery of the GDE technicians or trainers was not adequate; and the phasing-in of ICT programmes was not sustainable in some schools (Rasool & Naidoo 2024:8-9). Once again, the inadequate training of teachers is a recurring theme. However, in the Gauteng context there appears to be sufficient ICT infrastructure, but insufficient technical support.

Research has shown that available ICT resources in the classroom are either non-utilised or underutilised, thus negatively affecting the teaching and learning process. The DBE has conceded that the rollout of ICT-integration has not been effective mainly because of the lack of funds (Parliament of the Republic of South Africa, 2018). Garg, Shukla, and Kendall (2015) subscribe to the fact that cost can potentially derail the implementation of any ICT-integration plan. This is the reason why close to 11,858 primary schools did not have computer laboratories, while up to 9,313 lacked internet connectivity, across South Africa by July 2018 (Parliament of the Republic of South Africa, 2018). These stats are an indication that in spite of the efforts made by the DBE to integrate technology in classrooms, the majority of school children are yet to benefit fully. This reality therefore gives merit to this study whose focus is to understand the impact that the lack of ICT resources has had on teaching and learning.

### *Challenges associated with ICT integration in South Africa*

There are a number of stumbling blocks that plagued the directive for schools to effectively implement the ICT integration process. Challenges experienced at micro or school level persistently affect the motivational levels of teachers in the use of ICT in teaching and learning (Bingimlas, 2009); thereby stifling the ultimate objective of the DBE of ICT integration nationwide. There remains enormous challenges in South African primary schools (Pholotho & Mtsweni, 2016; Papaioannou & Charalambous, 2011; Wilson-Strydom et al., 2005). Ismail (2020) considers these challenges as common in developing countries.

The lack of ICT infrastructure is arguably the common or universal impediment to ICT adoption or integration. Without the necessary ICT technologies, tools or equipment, it is impossible to even speak of ICT integration. It is true that ICT infrastructure is costly and thus is not readily available to all schools. Mathevula and Uwizeyimana (2014) identified that in rural secondary schools, the more prevalent technologies available were TVs, photocopiers and laptop/desktop computers, and those basic technologies did not facilitate ICT integration. However, Dlamini (2022) found that even limited technological pedagogical knowledge, and minimal experience in integrating computers into the classroom, has had impact on ICT uptake.

On the other hand, the insufficient use of available technology is also linked to neglect of school infrastructure, poor management and limited maintenance (Nhlapo, Marais-Botha, Botha 2024:43). This raises the additional challenge of the lack of required technical support for schools and teachers that is necessary to train teachers to use ICT tools appropriately, as well as the maintenance and repair of ICT equipment. In this regard, Mirzajani et al. (2016) asserted that challenges that have to do with inadequate technical support in terms of ICT integration in the classroom are not unique to South African schools.

Another infrastructure and support-related challenge is intermittent internet connectivity and the absence of appropriate administrative support (Wilson-Strydom, Thomson, & Hodgkinson-Williams, 2005). Unstable Internet connectivity is a recurring hurdle that has affected many organisations across the globe (Arrieta, 2020; Habibi, Razak, Yusop, Mukminin, & Yaqin, 2020). Through the provision of stable internet connectivity, the underutilisation of computer facilities would be avoided (Pholotho & Mtsweni, 2016).

In the case where ICT infrastructure and equipment are available to schools, they may still be underutilised, due to lack of teacher ICT competence. Many studies (Rasool & Naidoo, 2024; Zenda & Dlamini, 2023; Nhlapo, Marais-Botha & Botha, 2024; Ramafi, 2022) point to the problem of teachers not managing to successfully utilise ICTs for pedagogical and curriculum delivery purposes. It would be uncharitable to solely blame teachers for this state of affairs. While it is expected that they should be well versed in the DoE ICT policy, without the necessary training, support and resources, they cannot make the transformation from traditional teaching methodologies to technological teaching and learning practices. In some cases teachers receive minimal ICT training, but it has little or no impact on their proficiency or confidence to use ICT for teaching (Mathevula & Uwizeyimana, 2014). Additionally, owing to the technical and administration challenges mentioned above, they are unable to attain ICT readiness or self-efficacy (Ramafi, 2022). Their capacity for proficiency goes hand-in-hand with ongoing technical and pedagogical support through professional development opportunities (Dlamini 2022).

An overarching challenge pertains to the digital divide between advantaged and disadvantaged schools in South Africa. The Covid-19 pandemic glaringly exposed the inequality and resource discrepancy between private or previously advantaged schools and public or previously disadvantaged schools. During the hard lockdown when teaching and learning had to be done remotely through technological and online tools, the majority of township and rural schools could not facilitate this process, due to lack of ICT tools for teachers and learners. This revealed the skewed provision of resources by the pre-democratic dispensation, where it became evident that “schools in suburban areas had the necessary resources to adopt alternative modes of teaching while township schools were unable to cope with the demand of relying on technological equipment” (Nhlapo, Marais-Botha, Botha 2024:43). More specific and context-based challenges will be discussed under the findings of the current study below.

## Methodology

In this section, sampling and data collection procedures are discussed, followed by data analysis.

### *Sampling and Data Collection*

This qualitative research outlines the impact of the lack of ICT resources on the learning and teaching process. The study survey (Yin, 2018) focused on three primary schools in South Africa, situated in areas where the socio-economic status is very low. The collection of data involved six educators who responded to semi-structured interviews on ICT-related issues. Two Grade 7 teachers were sampled from each individual school through the use of the purposeful sampling technique (Patton, 2005). Help was solicited from principals in identifying the relevant teachers who could take part in the survey. To ensure transparency (Aluwihare-Samaranayake, 2012), an intention to participate form was made available to them to indicate their willingness to participate voluntarily. All this was done to avoid abuse of power by the principals who had been given the opportunity to help in the selection process. In order to gain more information regarding the challenges faced due to lack of ICT resources, educators with more than ten years' experience in the teaching fraternity were part of the respondents. Their knowledge on the contextual challenges that hampered the learning process at their respective school was of great value. Questions that allowed participants to shed more light on the value of ICT in teaching and learning and the impact of the lack thereof, were posed. Through interaction, respondents demonstrated their knowledge of the way existing challenges impacted on the learners' abilities to learn and perform as expected. Interviews were recorded using an audio recorder after receiving permission from the participants. Although semi-structured interviews were used, follow-up questions were asked in order to seek clarification on certain matters. Double-checking of the data was done to ensure validity and reliability (Merriam, 2009). The researcher made use of manual coding as the researcher had developed an understanding of the nature of the data, making transcription easier (Williams & Moser, 2019).

### **Data Analysis**

Having manually transcribed and coded, data were collated and coded into major themes (Flick, 2018) through the use of thematic mode of analysis which was chosen mainly based on its flexibility (Terry, Hayfield, Clarke, & Braun, 2017). The analysis process facilitated the testing and reporting of coding reliability (Terry et al., 2017, p. 19). The main themes arising from the thematic analysis process encompass: (1) the purpose and importance of ICT in teaching and learning; and (2) the effects of the lack of ICT resources on teaching and learning.

### **Confidentiality**

To ensure confidentiality, the participating schools were coded A, B, and C. The educators who participated were designated as A1 and A2 for School A, B1 and B2 for School B, and C1 and C2 for School C.

### **Delimitation of the study**

The survey zeroed in on the effect the lack of ICT resources has had on teaching and learning in three primary schools that are located within a South African community whose socio-economic status is very low, in the Western Cape. In each of the schools, the study targeted Grade 7 classrooms simply because the grade is an exit point in the South African primary education system, where learners are presumed to have acquired a certain level of competency before proceeding to a higher level. As a result of this delimitation, only Grade 7 teachers from these respective schools were chosen to participate in the survey.

### **Study Limitations**

As a result of the limited sample of participating educators caused by the predetermined focus on Grade 7 classrooms, the conclusions thereof can apply only to the context under study, meaning it is not holistic in consideration of the South African perspective. This implies that further studies whose sampling approach is more inclusive are crucial.

### **Findings and Discussion**

The survey has undoubtedly established the relevance of ICT in teaching and learning environments, meaning the lack of it will negatively impact on the learners and the learning process. Nevertheless, the lack of or underutilisation of ICT resources should not be considered as a benchmark against which the academic performance of the learners should be measured although its impact cannot be understated (Denoon-Stevens & Ramaila, 2018; Hilton, 2018; Jimenez, 2020; Santos, Ramos, Escola, & Reis, 2019). Genlott and Grönlund (2016:69) pointed out that "as much as technology in itself does not lead to better student results, it may as well be used to reinforce pedagogic factors that have been shown to have positive impact." Two fundamental themes emerged from the findings and these are: (1) the importance of ICT in teaching and learning, and (2) the effect the lack of ICT resources has had on teaching and learning.

#### ***The relevance of ICT in teaching and learning***

The respondents shared the same sentiments that ICT resources have the ability to change the face of teaching and learning. The survey also established that even in those schools where ICT resources are not available, participants hypothetically conceded the fact that ICT would definitely give a huge boost to the learning and teaching process. More reference was given to its ability to motivate learners and influence their overall performance positively (Denoon-Stevens & Ramaila, 2018; Hilton, 2018; Khan, 2020; Santos et al., 2019). This is in agreement with Participant A1's view that the lack of ICT resources robs learners at School A of opportunities to make learning much easier. They reiterated that computers augmented the training of young minds in different ways. Research on their homework and other projects would be much easier as they can simply go online and get the necessary information. According to this participant, the lack of ICT resources has negative repercussions on learners' abilities to learn and perform. This assertion is echoed by Le Thi (2020), who pointed out that ICT resources facilitate the learner's engagement in individual research, thus enhancing self-study. Participant A2 also emphasised the importance of ICT in teaching and learning, judging from its absence in School A.

The participant pointed out the disadvantages the learners have been subjected to due to the lack of the ICT resources at the school. Padayachee (2017) also noted the potential that a lack of ICT resources has on determining the kind of education learners receive, with implications for their performance.

Through a survey carried out in KwaZulu-Natal, Hodgson, and Khumalo (2016) discovered that the availability of ICT resources could positively affect the way learners learn. In support, Hilton (2018) pointed out the importance of computers in the classroom and concluded in corroboration with Pohjolainen, Nykänen, Venho, and Kangas (2018) that ICT in the classroom has immense positive effects on learning. Research assignments and school projects are made much easier by use of computers. Besides, learners will have a different perspective on subjects such as Mathematics which, over years, has proven to be a bone of contentions in most primary schools (Hegedus & Moreno-Armella, 2020). This is very crucial as many scholars subscribe to the notion of Mathematics being a problem area in many South African primary schools (Bezuidenhout, Henning, Fitzpatrick, & Ragpot, 2019; Rabana & Martin, 2017), a phenomenon considered by Juta and Van Wyk (2020) as multifaceted.

#### *The impact the lack of ICT resources has on teaching and learning.*

Respondents explicitly elaborated on how the prevailing hurdles at their schools deterred and dampened the usage and integration of technology in the classroom thereby affecting learners' progress and potential. They alluded to the fact that these challenges affected learners' motivation levels and their desire to become what they value in life. Hodgson and Khumalo (2016), in collaboration with Le Thi (2020), asserted that apart from doing assignments, learners who are exposed to ICT resources are poised to do research that will give them the opportunity to familiarise themselves with their future careers.

#### *Theft, vandalism and insufficient funds*

Participants singled out theft, insufficient financial resources to procure data or repair broken computers, and insufficient technical and administrative support as some of the factors impeding the usage and effective integration of ICT. One respondent unequivocally pointed out that theft was the major stumbling block behind their school not having a computer laboratory. Therefore learners were deprived of this privilege, not because the DBE was not able to provide them, but because of the prevalence of theft.

Nevertheless, respondents did not shy away from shifting the blame to the DBE, since it did not provide sufficient security support, especially to schools in socio-economically disadvantaged communities. One of the participants pointed out that schools in such poor communities had multiple challenges that made them unlikely candidates to meet the expectations and conditions of the DBE. She explained that about 65 computers got stolen from their school. The ability of the school to then replace stolen computers or repair broken ones was compromised because it operated on a limited budget from the government. Thus, the decision of the government to obligate schools to cater for their own security was unrealistic given the small budgets allocated to schools. The ultimate negative consequences were felt more by the learners, who were deprived of the advantages that ICT resources ushered into the classroom.

Many other reports were given throughout the country regarding computer theft, highlighting that, in a wide range of South African contexts, schools with ICT resources have had to endure onslaughts as far as this challenge is concerned (African News Agency, 2019; Mbuza, 2019, 2020; Mdlongwa, 2012; Ngqakamba, 2020; Sedibe, 2011). This problem is however not confined to South Africa. Researchers such as Hussein, Abayo, and Mugambi (2019) and Mutisya and Mwanja (2017), from a Kenyan perspective, discovered a correlation between insecurity and ICT integration's ability to negatively impact on teaching and learning. Consequently, Ramorola (2017) reiterated the importance of bolstering physical protection and security at schools with computer facilities, a suggestive move that can help the government in achieving its millenium goal of quality education for all South Africans.

It is interesting to discover that because many socially and economically disadvantaged areas in South Africa are known for criminal behavior (Bhorat, Lilenstein, Monnakgotla, & Thornton, 2017), insurance companies are reluctant to cover property of schools located in such areas due to the high risk associated with such. Thus some participants from these areas indicated how unwilling the insurance companies are to partner with their schools, making it hard for them to receive some compensation in the event that their

ICT resources have been stolen.

### *Lack of support by DBE*

Considering the prevalent reports related to computer theft, participants were of the opinion that the DBE should take into consideration the physical circumstances of individual schools and, in some cases, provide security for such schools which procure ICT resources. The vandalization and theft of computer equipment across the country is a clear picture of the number of South African learners that have been deprived of opportunities to use ICT in the classroom (Maromo, 2020; Mbuza, 2020; Richardson, 2020). This assertion is very important because in some situations, the Department has managed to replenish stolen computers, although many schools then become reluctant to make use of the equipment for fear of theft and vandalism again. One example is a case where one school suffered 12 burglaries in four years (Ground Up, 2017). In spite of having the DBE coming through to replace the stolen computers in 2015, by 2017 they could not be used due to security concerns (Ground Up, 2017). This is a clear indication of the negative effects of poor ICT security and the implications it has on teaching and learning (Karunaratne et al., 2018).

In relation to the physical hurdles and security matters, respondents alluded to the responsibility that the DBE should take in helping schools through the process of repair or provision of financial resources so that schools will facilitate the repairs themselves. Eventually, this would promote continuity in the learning process and subsequent use of ICT resources. Respondents also echoed the need for the DBE to assume an active and leading role in engaging reliable insurance companies for the ICT properties. The participants affirmed that the higher the risk experienced as a result of ICT resources, the greater the chances of depriving affected learners of the chance to benefit from the ICT-rollout plan by the DBE. At the same time, Hodgson and Khumalo (2016) asserted that the learners' lack of access to ICT resources will rob them of enjoying the benefits that technology brings in the classroom. This assertion is worth taking note of since the impact of the lack of ICT resources analysed in this study is not only unique to the concerned schools, but seemingly a nation wide problem.

The effects that the lack of ICT resources have on teaching and learning can be ongoing should there be reluctance especially on the part of the DBE to be actively involved in allocating resources towards the mitigation of security challenges. This assertion is anchored on the nationwide theft and vandalisation of ICT resources in many schools across South Africa, an occurrence that was also triggered by the hard nationwide lockdown that came as a result of COVID-19 (Maromo, 2020; Mbuza, 2020; Ngqakamba, 2020). Research has shown that this is not because the DBE is not aware of the challenges, neither has it failed to find a solution (see Parliamentary Monitoring Group, 2019).

### *Broken or damaged ICT equipment*

It is important, at this juncture, to point out that theft and a lack of ICT resources are not the sole challenges standing in the way of the use of ICT resources in the classroom. This survey established that some schools had computer laboratories but unfortunately the computers were not in working condition. As a result, educators could not make use of them to promote the learning process. One participant indicated that these computers broke down so often that learners found it difficult to progress in their academics, especially the ones who needed them for research (see Le Thi, 2020; Papaioannou & Charalambous, 2011; Wilson-Strydom et al., 2005). Thus, in spite of the ICT resources being available in schools, they could not help to augment the learning process because of the state the learners found them in and schools could do very little about it due to lack of funds. This aligns with Hodgson's (2012) assertion that, out of approximately 20 computers owned by a poor school in the outskirts of Durban, South Africa, not even one of them was in good condition, a scenario that really interrupts the teaching and learning process.

### *Use of unqualified IT technicians*

The other problem was the tendency of schools, who were given the authority to repair, subsequently looking for unqualified IT technicians who would do more harm than good, thus worsening the situation (Karunaratne et al., 2018; Opoku, Badu, & Alupo, 2016). Due to budgetary limitations, some schools chose the cheaper route of contracting unskilled technicians who, instead of solving the

problem, ended up aggravating the frequency of computer breakdowns, thereby further restricting learners from having regular access to the technology.

## Conclusion

The survey explored the effects of the shortage of ICT resources in classrooms in identified South African primary schools. In other words, the main purpose was to establish the impact the lack of ICT resources has had to date, on teaching and learning. The findings thereof point to how crucial ICT resources are in a classroom situation while at the same time explicitly showing the negative repercussions of not having such. The research has shown that the lack of ICT resources is a source of frustration to the hopes and aspirations of learners, thereby preventing them from enjoying and capitalising on the benefits that come with the integration ICT tools into the learning intervention. Thus, the current situation in the selected schools is an indication that the DBE really has to find means and ways of reviewing its ICT-integration plans and policies, and how it can identify and address challenges that individual schools encounter nationwide. It is therefore recommended that DBE revamp its monitoring and evaluation approaches in order to recognise and timeously resolve constraints related to ICT availability and integration in individual school contexts. According to this research, such an approach will ensure that the available resources will not remain unused, underutilised, or become stolen as a result of poor security. Such misdemeanor would epitomise a major setback in the DBE's efforts to guarantee that all children are exposed to quality education in an era in which technology is fast becoming a teaching and learning mode of choice. Given the inability of the DBE to capacitate all schools nationwide, we also recommend that schools come on board, through partnering with communities, to bolster safety. The rampant vandalism and theft of ICT equipment in schools, especially during the hard lockdown, was promoted by poor security measures in schools. As a result, more research on ICT-related hurdles at national level is of paramount importance as this will help provide a holistic perspective of the situation on the ground, which will eventually assist the government on how to mitigate the effects.

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