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

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Abstract

The effect of Information and Communication Technology (ICT) on the teaching and learning fraterinity has globally necessitated its integration in the classroom. Nevertheless, it is important to note that the quest for Integration in individual school contexts remains an uphill task in-spite of 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 findindings thereof demonstrated that, due to many reasons, many schools do not make use of ICT tools in teaching and learning, as expected, and, in most cases, they do not maximise of the use of the existing resources, thus affecting the teaching and learningn processes. The reasearcher recommends that the South African Department of Basic Education (DBE) seriously takes into consideration individual school contexts when allocating ICT resources in order to try and mitigate the challenges. Stepping up the monitoring and evaluation mechanisms that are currently at play will help identify contextual challenges and the provision of assistance where necessary. Security issues also call for schools to team up with local communities to try and fight the theft and vandalization of IT resources. All these measures are meant to facilitate the preservation and use of ICT resources in the classroom for the betterment of the learning process.

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

1 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. The 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 got unique and context based challenges that can not be related to any other school thus the need to contextualize that challenges and solutions. Thus, Rabah (2015, p. 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 detrimental and different implications. Research carried out on ICT integration in teaching and learning in Hong Kong identified possible contextual challenges (Yuen, Law, and 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 insuffient resources has become a serious hindrance to the full and maximum usage of ICT in some classrooms. Khan (2020) argued that the usage of ICT in teaching and learning bears the ability to improve learner achievement, moreso in areas where people are of low socioeconomic status who cannot afford to send their children to better schools. This necessitates the need for 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 dimesnion of the results or consequences of lack of ICT resources on teaching and learning in selected South African primary schools.

2 Literature Review

2.1 Research context

In order to obtain a better analysis of the nature of ICT integration in classrooms throughout the nation of 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, p. 411). The Department of Education (DBE) classifies the schools selected for this survey as quintile 1 (no-fee) schools. Such schools are beneficiaries of the same government support and have the same catchment area. This categorization sterms from the National Norms and Standards for School Funding (NNSSF) policy, whose objective is to guarantee equity and redressing imbalances created by the apartheid era in all aspects which include education (DBE, 2011).

Of great importance is noting 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:

- What is the importaance of ICT resources on teaching and learning in primary schools?
- What effect does the lack of ICT resources have on teaching and learning in primary schools?

2.2 ICT integration in South Africa: a retrospect

In the past 20 years, South Africa has been trying by all means to consistently harness efforts and resources towards the attainment of a paperless classroom, 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 ICT's merits 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, p. 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 evry individual 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 prevalance of ICT facilities, moreso in poor communities, has the ability to develop social capital and empower individuals and the community, a notion subscribed by Ismail, Jogezai, 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, regarded by the Minister of Basic Education as further compromising the learning process (Maromo, 2020; Mbuza, 2020). The 2013–2025 e-Education strategy of the DBE is one achievement that acts as a campus to 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). In giving feedback on how this plan is progressing, the DBE in February 2018 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). Statistics given by the DBE show that the integration plans are going on very well; and the Western Cape is ranked the fourth province in terms of South Africa's ICT penetration. In-spite of the positive figures, the remaining question that needs to be addressed is whether the majority of primary school learners in socio-economically disadvantaged communities in the Western Cape of South Africa are enjoying fully from this this government initiative.

Research has shown that available ICT resources in the classroom are either non-utilized or underutilized, thus affecting the teaching and learning process in a negative way. 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 and 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 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.

2.3 Challenges associated with ICT integration in South Africa

There are a number of stumbling blocks that plagued the quest for schools to effectively implement the ICT integration process. The would included intermittent Internet connectivity and the absence of appropriate administrative support (Wilson-Strydom, Thomson, & Hodgkinson-Williams, 2005). Apart from inadequate technical support to maintain ICT equipment there remains enormous challenges in South African primary schools (Papaioannou & Charalambous, 2011; Pholotho & Mtsweni, 2016; Wilson-Strydom et al., 2005). Ismail (2020) considers these challenges as as common in developing countries. 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 only. Howeever, these challenges can surely be overcome if the administration work together closely to single out and deal with them decisively. Through this kind of approach, stable internet connectivity would be guaranteed thus avoiding underutilization of computer facilities (Pholotho & Mtsweni, 2016). Unstable Internet connectivity is a reccuring hurdle that has affected many organisations across the globe (Arrieta, 2020; Habibi, Razak, Yusop, Mukminin, & Yaqin, 2020). Challenges experienced at micro or school level have really affected the motivational levels of teachers in the use of ICT in teaching and learning (Bingimlas, 2009) thereby stiffling the unltimate objective of the DBE of ICT integration nationwide

3. Methodology

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

3.1 Sampling and Data Collection

This qualitative research outlines on the impact of the lack of ICT resources on the learning and teaching process. The survey of case study (Yin, 2018) focused on three primary schools within South Africa, situated in areas where the socioeconomic 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 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 shade more light on the value of ICT in teaching and learning and the impact of the lack thereof were administered. 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 and this only after the permission from the participants. Although semi-structured 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).

3.2 Data Analysis

Having manually transcripted and coded, data were put together 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). Besides, its analysis process facilitates 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.

3.3 Confidentiality

To ensure confidentiality, the participating schools have been 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.

4. 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 community whose socioeconomic status is very low in South Africa. In each of the schools, the study targeted Grade 7 classrooms simply because of it being an exit point in the South African primary education system where learners are presumed to have acquired a certain level of competency before proceding 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.

5. 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 really need to be carried whose sampling approach should be more inclusive.

6. 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 to pull their best in the learning process. Nevertheless, the lack of or underutilization of ICT resources should not be considered as a benchmark against which the academic performance of the learners should be measured although its impact thereof can not be understated (Denoon-Stevens & Ramaila, 2018; Hilton, 2018; Jimenez, 2020; Santos, Ramos, Escola, & Reis, 2019). Genlott and Grönlund (2016, p. 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 fundamenta 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.

6.1 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 leaning 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 robes learners at School A of opportunities to make learning much easier. The reiterated that computers augmented the training of young minds in different ways. Research on their home works 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 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 A2. The participant pointed out the disadvantages the learners have been subjected to due to the lack of the ITC 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 learners' learning. Research assignments and school projects are made much more easier by use of computers. Besides, learners will have a different perspective for subjects such as Mathematics which, over years, have proven to be a bone of contentions in most primary schools (Hegedus & Moreno-Armella, 2020). This is very crucial as other more scholars subscribe to the notion of having Mathematics as one

of the problem areas 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.

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

Respondents explicitly ellaborated on how the prevailing hurdles at their schools detered and dumpened 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 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 familiarize themselves with their future careers.

Theft 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 such a priviledge 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 Department since it did not give enough security support especially to schools in socioeconomically disadvantaged communities. One of the participants pointed that schools in such poor communities had multiple challenges that made them made them to be 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 by its operating on a shestring budget from the government. Thus, the decision of the governement to oblige 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 onslaghts 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 only. Researchers such as Hussein, Abayo, and Mugambi (2019) and Mutisya and Mwania (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 relevance of bolstering physical protection and security to 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 much interest 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 comppanies are to partner with their schools making it hard for them to receive some compensation in the event that their IT 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 have just procured ICT resources. The just ended 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 in that 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 stollen 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) asseted that the learners' lack of access to ICT resources will rob them of enjoying the benefits that technology brings in the classroom. This asertion 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 of that the lack of ICT resources has on teaching and learning has the ability to take longer should there be reluctance especially on the part of the DBE to be actively involved and harness resources towards the mitigation of security challenges. This assertion is anchored on the nationwide theft and vandalization of ICT resources in many schools across South Africa, an occurance that was 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 Department is not aware of the challenges, neither has it failed to find a solution (see Parliamentary Monitoring Group, 2019).

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 system. One participant indicated that these computers broke down so oftenly that learners found it difficult to progress in their academics esCHISpecially 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, not even one of them was in good condition, a scenario that really interrupts the teaching and learning process.

Use of unqualified IT technicians

Apart from this challenge, the other problem was the tendency of having schools, afer being given the authority to repair, would look for unqualified IT technicians who would do more harm than good thus worsening the situation (Karunaratne et al., 2018; Opoku, Badu, & Alupo, 2016). Thus, because of budgetary limitations, some schools chose the cheaper route of contracting unskilled technicians who, instead of solving the problem, ended up worsening it by aggravating the frequency of computer breakdowns thereby further restricting learners from having regular access to the technology.

7. 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 repecursions of not having such. The reseaarch has shown that the lack of ICT resources are 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, 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 recognize and resolve constratints related to ICT availability and integration in individual school contexts timeously. According to this research, such an approach will ensure that the available resources will not remain unused, underutilized, or become stolen as a result of poor security. Such misdemeanor would

epitomize 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 capacitate all schools nationwide, we also recommend that schools come on board, through partnering with communities, to bolster safety. The rampart 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 pespective of the situation on the ground which will eventually assist the government on how to mitigate the effects.

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