# COVID-19, education and access to digital technologies: A case study of a secondary school in Gauteng

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The first South African case of the coronavirus disease (COVID-19) in March 2020 escalated to the national lockdown by the end of March 2020. This caused serious repercussions for learners, as there is a lack of infrastructure in South Africa to support online teaching and learning. The purpose of this study was to investigate the use of digital technologies during COVID-19 by teachers. A case study was used and data were collected using a desktop literature review and a semi-structured, open-ended, qualitative questionnaire. The questionnaire was administered to teachers at a secondary school in the Gauteng province, South Africa (SA) and Atlas.ti was used for data analysis. We conclude that online learning was affected by socio-economic problems, the high cost of data and the lack of devices and parental supervision. The recommendations include ways in which government could prepare for future crises that could arise, as well as promoting ongoing attention to digital technology use in teaching and learning to address the digital divide in South Africa. With this study we add to the body of knowledge regarding COVID-19 and the use of digital technologies in teaching and learning, which will assist the government and teachers in understanding the problems and solutions for the use of digital technology in teaching and learning.

**Keywords**: COVID-19; digital technology; online learning; secondary school education; teachers

## Introduction

On 5 March 2020, the Minister of Health, Dr Zweli Mkhize, confirmed the first positive case of the coronavirus disease (COVID-19) in South Africa (SA) (National Institute for Communicable Diseases, 2020). On 23 March 2020, President Cyril Ramaphosa announced a 21-day country-wide lockdown from 26 March 2020 to put emergency measures in place to prevent the spread of the virus (*InSession*, 2020).

The highly contagious COVID-19 required drastic measures, recommended by the World Health Organization (WHO) and implemented by governments worldwide, to deal with ensuing respiratory illness that could prove fatal to the elderly and people with co-morbidities, which include diabetes, cardiovascular disease, chronic respiratory disease, and cancer (WHO, n.d.).

The lockdown was first enforced in Wuhan in January 2020 and was used by the Chinese authorities in an effort to prevent the spread of the virus. Lockdown is defined as "a set of measures to reduce community transmission of COVID-19 that are compulsory and which are applied indiscriminately to the general population" (Mboera, Okipede, Banerjee, Cuevas, Czpionka, Khan, Kock, McCoy, Mmbaga, Misinzo, Shayo, Sheel, Sindato & Urassa, 2020:308). Lockdown could result in problems, which, according to Mboera et al. (2020), include direct and indirect injuries. Disruption of education is classified as an indirect injury. Finding ways for learners to continue with their school could mitigate the indirect injury.

The implementation of the drastic measures to prevent the spread of the disease included the forced full or partial closing of schools. This led to adverse effects being experienced by more than 1.5 billion learners around the world. As stated by the United Nations Educational, Scientific and Cultural Organization ([UNESCO], 2020:para.1), the problems included the fact that "over 100 million additional children will fall below the minimum proficiency level in reading." Education systems in many countries, especially in developing countries, were ill equipped to deal with the problems created by school closures and protecting the rights of learners to education. Problems included finding ways to adapt learning methods and education and school systems, as well as implementing policies to mitigate and recover the loss of learning.

The National Income Dynamics Study – Coronavirus Rapid Mobile (NIDS-CRAM) reports learner dropout numbers at $\pm$750,000 in SA due to COVID-19 (Mlaba, 2021). One of the reasons was that learners were required to participate in online learning but were unable to access information, which caused a loss of large chunks of information.

On 30 April 2020, the Minister of Basic Education, Angie Motshekga, announced plans to support learners during the lockdown. Such support included digital technologies such as television and radio broadcasting of lessons, the availability of electronic readers, an educational platform that was freely downloadable and available in indigenous languages and free access to virtual classrooms (Press statement by the Minister of Basic Education, Mrs Angie Motshekga, MP on the basic education sector recovery plans for the reopening of schools, following the COVID-19 lockdown adjustment of regulations, 2020:para. 18–20). After the first lockdown that lasted longer than 21 days, with classes only being phased in from 6 May 2020, there were further intermittent lockdowns and learners lost many days of schooling. Even when learners were eventually able to return to school, the need for social distancing prevented all learners from returning simultaneously and alternative methods of teaching, such as rotational learning, were implemented, where learners were divided into smaller groups and only attended classes every second week to ensure social distancing. Many learners had to rely on alternative methods to access

learner material, including learners who were in isolation or quarantine due to positive testing or exposure to COVID-19.

As a developing country, SA not only has to deal with the digital divide between developed and developing countries, but due to a lack of access to digital technologies, there are differences between urban and rural distance education learners (Lembani, Gunter, Breines & Dalu, 2020). The factors hindering access to digital technologies for distance learning include "education, income and the economic development imbalances between urban and rural areas" (Lembani et al., 2020:73–74).

## Literature Review

On 20 April 2021, UNESCO (2021a) recorded that, 28 countries had implemented country-wide school closures; 174,248,279 learners were affected. The education sector of UNESCO deals with several key issues relating to the education problems that arose due to COVID-19, covering many topics and offering ways to mitigate the problems of school closures (UNESCO, 2020). These issues include health and nutrition, teaching and learning, equity and equality, culture, policy and planning, education problems for vulnerable population groups as well as education for sustainable development. Sharma (2020) notes that worldwide over 1.2 billion children of school-going age were out of school compared to 258 million in 2018. According to Sharma (2020:para. 2), "schools have been more than just places of learning; policy designs have moulded them into safety nets for children" and these safety nets have been destroyed by the COVID-19 pandemic, leaving many vulnerable children. The impacts of closing schools include learning losses and learning problems experienced by children from low- and middle-income countries; missed daily meals as result of the closing down of school feeding schemes leading to malnutrition and hunger; pressures of parenting where parents are not able to cope with the education of their children (Sharma, 2020).

Worldwide, schools and universities implemented online teaching and learning or blended learning – a combination of online and traditional teaching. The digital divide between developed and developing countries became even clearer with regard to online learning. UNESCO (n.d.) notes that the disparities are obvious. Internationally, 50% of learners do not have computers and 43% do not have internet access; however, in sub-Saharan African, 89% do not have computers and 82% have no internet access. Half of the 56 million learners who lack mobile network services are in sub-Saharan Africa (UNESCO, n.d.).

Sharma (2020) notes that compared to 65% of lower-middle income countries, only 25% of low-income countries have been able to use remote learning platforms. The author also expresses concerns about the use of remote learning platforms and the lack of research on their suitability to assist different learners, while these learners and their families deal with the problems created by COVID-19 (Sharma, 2020).

COVID-19 showed that the future could be unpredictable and highlighted the need for continued use of digital learning platforms and tools to mitigate challenges in teaching and learning, such as those exposed by the pandemic. These challenges extend to potential future problems and viruses that may have similar consequences for education. UNESCO (2021b:2) suggests that Africa should rethink and transform African education systems to close the digital divide and should undertake to create new policies dealing with connectivity and internet access in schools, the provision of Wi-Fi devices loaded with curriculum to learners and teachers; and retraining teachers on the use of digital technology.

A study by Shava (2022) highlights that even though the use of information communication technology (ICT) was widely embraced for education during the pandemic, the challenges experienced still remained after COVID-19. These challenges include inadequate integration of teachers and learners in ICT adoption; the current digital divide and lack of skills in ICT that could exclude rural learners; the lack of learners' and teachers' ICT skills that could impede ongoing use of online learning; the exorbitant costs of data, especially in the current economic climate; and the risks of cyber-attacks (Shava, 2022). Maree (2022:253) concurs and confirms that, while some schools were able to deal well with the transition to virtual platforms for teaching, "many school in disadvantaged, impoverished, and resource-scarce regions have struggled to make the transition from teaching almost exclusively in in-person format to teaching and learning successfully in online format." Maree (2022) notes that there is support for the continued online education or blended learning approaches in education. Paschal, Pacho and Adewoyin (2022), referring to problems in Africa, point out that to counteract these problems after COVID-19, resources should be allocated to technology, blended learning methods should be applied continuously, the availability of consistent internet access should be ensured, training opportunities for the acquisition of computer operation skills should be ongoing, while ICT support centres in institutions should be equipped to deal with problems timeously.

In SA, the Department of Basic Education (DBE) is responsible for primary and secondary schools and the Department of Higher Education and Training (DHET) is responsible for tertiary education and vocational training (Statistics South Africa [Stats SA], 2021). The DBE has an estimated 26,000 schools and 425,000 teachers with nine provincial offices and 86 school districts (Macha &

Kadakia, 2017). The school system is made up of the General Education and Training (GET) band – divided into the Foundation Phase (Grades R to 3), Intermediate Phase (Grades 4 to 6) and Senior Phase (Grades 7 to 9), and the Further Education and Training (FET) band (Grades 10 to 12) (DBE, 2015).

In South Africa, 14,612,546 learners were affected by the lockdown of schools, of which 5,052,180 learners were in secondary schools (UNESCO, 2021c). UNESCO recorded that South African schools were closed for 29 of 52 weeks since the start of the pandemic (UNESCO, 2021b). This does not bode well for SA, as Macha and Kadakia (2017:para. 35) refer to the ongoing "poor quality of education" and note that "South Africa continues to be one of the worst education systems in the world", highlighted by poor learner performance and high dropout rates.

As a developing country, SA was hit hard by the COVID-19 pandemic. According to Teresi (2021:para. 1), 18% of SA's population live under the poverty line and the pandemic caused SA to be on "the brink of a serious social and economic crisis" with a continual downslide. During the budget speech, the Minister of Finance noted that 2.2 million jobs were lost in the second quarter of 2020 and unemployment exceeded 32% in the fourth quarter (Naidu, 2021). Omarjee (2021) reports unemployment at 34.4%, leaving 7.8 million without jobs. The effect of these socio-economic factors must be considered in the use of digital technology in schools.

The key issues dealt with in this study were teaching and learning problems experienced by teachers relating to access to information and digital technologies, and policy and planning shortfalls that deal with COVID-19 problems. I investigated the perceptions of teachers in a secondary, quintile 5 school (school in affluent communities) in Gauteng, SA, on their experiences of problems related to the use of digital technology for teaching, as well as policy and planning measures to mitigate the problems associated with COVID-19 and distance learning strategies.

## Theoretical Framework
A realist approach, grounded in post-positivism was the basis of this study because "[p]ost-positivism argues that one can make reasonable inferences about a phenomenon by combining empirical observations with logical reasoning" (Bhattacherjee, 2012:18). This was used to explore the problems and the social reality of the phenomenon of COVID-19 and education. A single case study design was used because a case study "is an in-depth exploration of a particular case or unit" (Cassim, 2021:69). The benefit of a case study is to focus on a specific school to understand the challenges that the teachers faced; however, due to the small sample size, there is a limitation in "the extent to which you can generalise

your findings to other contexts or situations" (Cassim, 2021:69). In this instance, the case under study was a secondary school in the Gauteng province of South Africa.

## Methodology
The interpretative phenomenological analysis method was used as phenomenological inquiry is "concerned with the systematic reflection and analysis of phenomena associated with conscious experiences" (Bhattacherjee, 2012:109), such as participants' perceptions.

Sampling means to collect data from a large group but because of time and cost constraints, it is possible to collect data from case studies and draw conclusions for the rest of the group (Walliman, 2011:93). As this was a single case study, this generalisation must be approached with caution. The target population was all secondary schools in SA, the sampling frame was public secondary schools in Gauteng and the sample was narrowed down to a single case study, namely Secondary School A (pseudonym), which was selected using purposive sampling.

The study comprised of two phases, namely a desktop literature analysis and an empirical study. The literature review served as the groundwork for the empirical study, where existing research was analysed to identify key issues such as limitations of internet access, scarcity of devices, connectivity challenges and loss of teaching hours. I also explored strategies used to address these problems, with a specific emphasis on the effectiveness of the digital technology delivery systems. With the empirical study, building on the literature review, I aimed to further examine the challenges faced by learners and teachers in accessing and utilising digital technologies, as well as disseminating information in the teaching and learning environment. Together, these two phases provided a comprehensive understanding of the common problems and their potential impact on educational success. These phases were designed to address the following research question: What problems relating to the use of digital technology in teaching and learning, are faced by learners and teachers at a selected secondary school in Gauteng, SA? The primary objective was to investigate the impact of COVID-19 and the use of digital technology in teaching and learning in a secondary school in Gauteng, SA. In order to achieve the primary objective, the following secondary objectives were formulated:

- To investigate the problems relating to access to information and use of digital technology in distance education, during the COVID-19 pandemic, globally and locally;
- To analyse the perceptions of teachers regarding the problems learners faced relating to teaching and learning and access to digital technologies during COVID-19 in the SA classroom; and

- To determine possible solutions for digital technology problems faced by learners and teachers, relating to teaching and learning, in the event of

further emergencies or pandemics.
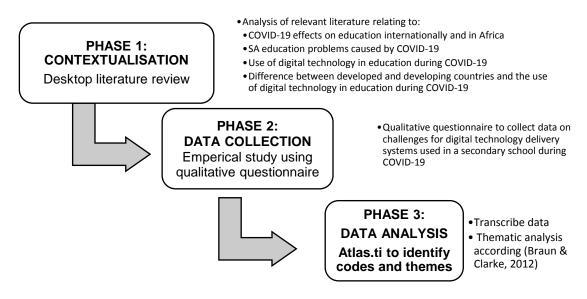The phases of the research design are set out in Figure 1.



**Figure 1** Phases of the research design

A desktop literature analysis of the relevant sources relating to the impact of COVID-19 on education was conducted to investigate problems that learners and teachers experienced globally. With a qualitative approach, the literature review frames and contextualises the problem, while creating a backdrop to understand the problems (Creswell, 2014) and the central phenomenon to be explored. COVID-19 is the central phenomenon in this study but the relevant topical areas included its effects on education, school closures, the transmission of information and work to learners and, the access and use of digital technologies to support distance education.

The desktop literature analysis in this study was conducted using various search sites and platforms to gather relevant sources, such as Google, Google Scholar and EBSCOhost. Different platforms such as peer-reviewed journal articles were explored. Specific keywords related to the research topic were used to locate relevant material (Creswell, 2014) and effectively conduct the search, such as "pandemic", "lockdown challenges", and "technology access", which helped to narrow down the search results and focus on the relevant literature. In addition, key organisations and institutions whose publications and resources were valuable for the study were identified. Considering the publications and guidelines from these organisations ensured the incorporation of authoritative and up-to-date information in the analysis. This comprehensive approach helped to gather a diverse range of sources to lay the foundation for the empirical study. A summary of criteria used for this desktop literature analysis is set out in Table 1.

**Table 1** Summary of criteria used for desktop literature analysis

| | |
|---|---|
| Search sites | North-West University (NWU) academic library; Google; Google Scholar; EBSCOhost; government agencies |
| Search platforms | Peer-reviewed journal articles; newspaper and magazine articles; government publications; policies, papers and acts. |
| Key words for searches | Coronavirus+; COVID-19+; pandemic+; lockdown challenges; education; digital technologies; online learning; digital divide; technology access |
| Organisations | World Health Organization (WHO); UNESCO; SA Government; Department of Basic Education (SA); National Institution of Communicable Diseases (SA) |

The desktop literature analysis provided the groundwork for the empirical phase of the study, ensuring that the questions in the empirical study dealt with relevant information. The problems that formed the basis of this investigation and that were identified in the literature review related to a lack of internet access, a lack of devices, an inability to connect to the online learning platforms, loss of teaching hours, and methods used to mitigate the problems. Of specific interest is the loss of teaching and learning hours and whether the methods used to

mitigate the problems, namely using digital technology delivery systems, were successful.

The empirical portion of the study was important to identify common problems experienced by teachers that would hinder success in the teaching and learning environment, specifically relating to access to and the use of digital technologies and the dissemination of information to learners.

A qualitative approach was used in this research as this study was based on a questionnaire designed by UNESCO (2020) for collecting data to inform future policy and planning. The UNESCO questionnaire used a quantitative approach, so a qualitative approach was chosen as it provides a more in-depth investigation, allowing for enhanced insight into the study subject (Creswell, 2014). Using a qualitative questionnaire, data were collected from teachers at Secondary School A. The questions were derived from the literature review and based on the UNESCO Survey on National Education Responses to COVID-19 School Closures (UNESCO, 2020). The questions were open-ended, semi-structured and administered via the online platform, Google Forms. After drawing up the questionnaire, it was pilot tested with three teachers from a secondary school that did not form part of the research study to ensure that the format was suitable, the language understandable, and to assist in ensuring the validity of the content (Creswell, 2014). Thereafter, minor adjustments were made to improve the questionnaire before it was distributed to the sample. The open-ended, semi-structured questionnaire used for this study comprised three sections. Section A collected demographic information, such as number of learners, subjects and the position of the teacher. Section B collected data relating to the use of digital technologies and the dissemination of information to learners, while Section C collected data on policy and planning to deal with the phenomenon of COVID-19.

Several recommended safety measures assist to prevent the spread of COVID-19, such as physical distancing and avoiding crowds (WHO, n.d.). The Gauteng Department of Education (GDE) states in the GDE Research Approval Letter 8/4/4/1/2 (2021:para. 3) (pers. comm.) that "[b]ecause of COVID 19 pandemic researchers can ONLY collect data online, telephonically or make any arrangements for Zoom with the school Principal." The school principal was contacted by electronic mail (email), requesting approval from the governing body to conduct the study via Google Forms. Once approval was received, all further correspondence was via email and teachers were requested to sign and return a permission letter with an email address if they agreed to participate in the study.

In a qualitative study, the researcher, by offering detailed descriptions or different perspectives about a theme, will ensure richer, more realistic results, which will accentuate the validity of the findings (Creswell, 2014); providing different perspectives also increases the validity of the research. Reliability was ensured by documenting the steps to the procedures used in the collection and analysis of the data.

Trustworthiness, as noted by Guba (1981), was considered for this study. The four components mentioned by Guba (1981) are truth value, applicability, consistency, and neutrality. Truth value refers to data accurately reflecting the phenomenon under investigation; this was ensured by using teachers who are qualified to answer the questions. Applicability applies to whether the data collected were suitably applicable to a larger sample. Consistency was ensured by providing details of the methodology and comparing the desktop literature review with the data collected. I attempted to remain neutral while reporting on the participants' views (Guba, 1981), thus attempting neutrality.

As this was a single case study on Secondary School A in Gauteng, it is difficult to generalise the findings to all secondary schools in Gauteng. Secondary School A is an academic school with learners from economically diverse home situations, therefore, another school in Gauteng would not necessarily produce the same results for a similar study. However, the results could be added to a database of problems experienced with digital technology in education and some problems could be generalised for other schools in the same area or the country.

Unlike quantitative data that require statistical data analysis techniques, qualitative data require classifying things, persons and events and the properties that characterise them (Creswell, 2014). The thematic analysis process (Braun & Clarke, 2012) was used to analyse the data collected for this study, which was conducted in three phases, as indicated in Table 2.

**Table 2** Phases of the thematic analysis approach (adapted from Braun & Clarke, 2012)

| | |
|---|---|
| Phase 1 | Researcher becomes familiar with the data |
| Phase 2 | Generating initial codes. Atlas.ti is used to enter data and code the information |
| Phase 3 | Searching for themes to identify similar themes and link these into sets |
| Phase 4 | Reviewing potential themes, including analysing the quality, range and diversity of the data |
| Phase 5 | Defining and naming themes. Unique and specific characteristics of each theme are identified, ensuring that there is a single focus to each theme |
| Phase 6 | Producing the report. In this final phase, the report is completed; the writing and analysis occur together in qualitative research |

Ethical approval was obtained from the Research Ethics Committee of the Vaal University of Technology (Ethics clearance number FRECMS-05052021-069) and the GDE (8/4/4/1/2); ethical procedures required by these institutions were followed. Ethical rules and principles followed included voluntary participation of participants; efforts to mitigate mental or emotional harm to participants (the consent form included the WHO website addresses to resources offering assistance in dealing with the negative impact of COVID-19, as well as contact numbers for the local Families South Africa [FAMSA], which offers assistance with psychosocial support services, if the need arose); anonymity and confidentiality to participants and the school; analysing and reporting on results without bias; and storing data in a safe place (Creswell, 2014).

### Results/Findings

Forty-three teachers employed at Secondary School A were given the option to participate and were required to complete a consent form to indicate their willingness to participate. Thereafter, a questionnaire was sent to the participants via Google Forms. A total of 65% of the teachers ($n = 28$) agreed to participate in the study and, of these, 32% ($n = 14$) returned the completed form via Google Forms. The return rate of questionnaires was not optimal at 32% and not all subject teachers were represented. However, upon examination of the data, I decided that the answers to the open-ended questions had reached data saturation. In qualitative research, data saturation occurs when "the researcher stops collecting data because fresh data no longer sparks new insights or reveals new properties" (Creswell, 2014:248). In the reporting below, participants are referred to as P1 to P14 to ensure anonymity and questions are referred to as, for example, A-1 for Section A, Question 1. Reporting on the qualitative data obtained from the participants follows a representation of the demographics in Secondary School A (cf. Figure 2).

Section A: Demographics
Section A in the questionnaire dealt with demographic information of participants and the number of learners taught by the participants during a timetable week (A.1), which is presented in Figure 2.
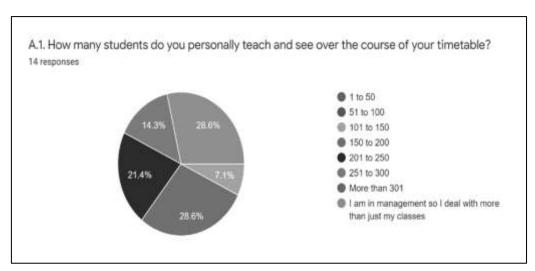


**Figure 2** Number of learners taught by the participants

Figure 2 indicates that 28.6% of the teachers dealt with between 150–200 learners, 28.6% were in management and dealt with +300 learners, 21.4% dealt with 201–250 learners, 14.3% with 251–300 learners and 7.1% with 101–150 learners during the course of the timetable week.

Regarding the positions held by the participants (A.5), 64.3% were teachers, 21.4% occupied a position of either principal or deputy principal and 14.3% occupied a position of head of department.

Participants taught all secondary school grades (A.2), namely grades 8 to 12, with the majority teaching grade 10 (71.4%) (cf. Figure 3).
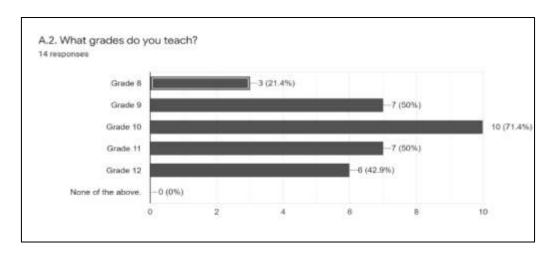
**Figure 3** Grades taught by participants

Different subjects are taught in the Senior- and FET Phase (cf. Figures 4 and 5). The participants taught a large majority of the subjects, but not all subjects (A.3 and A.4).
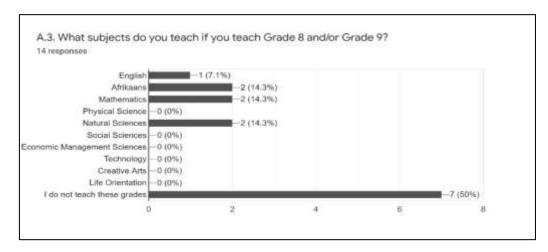


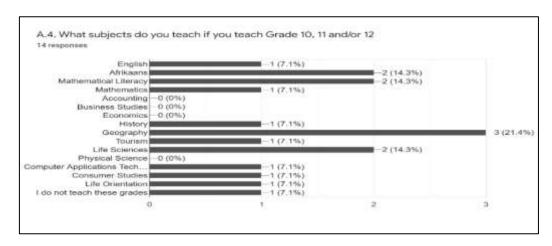**Figure 4** Subjects taught by participants – Senior Phase



**Figure 5** Subjects taught by participants: FET Phase

**Section B: Use of Digital Technology for Teaching and Learning**
Atlas.ti was used to code the data collected in Section B. Coding is interpretive and it is "most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2009:3).

In Question B.1, participants needed to provide details of assistance to learners to deal with the loss of teaching and learning. Two specific themes emerged from the data collected, namely access to learning material and adjustments. Under access to learning material, participants noted that they had provided extra worksheets, summaries, study packs and extra classes, among others. Under adjustments, participants listed content and scope adjustments and trimming, timetable changes and adjustments and adjusting class numbers. Participant 1 (P1) indicated making him/herself available to learners; however, how this was done was not explained.

The responses to a question about the digital technology delivery systems used by the school or participants for delivery of lessons and/or content (B.2) are presented in Table 3.

**Table 3** Delivery systems used by participants

| Delivery system | Number of participants |
|---|---|
| WhatsApp and WhatsApp Groups | 14 |
| Zoom | 1 |
| Microsoft Teams | 1 |
| Google Drive | 1 |
| Google Classroom | 1 |
| Facebook | 1 |

Participants were not asked how they rated the suitability of the digital platform, but P3 noted:

P3: *I did Zoom teaching for a while – very unsatisfactory, used WhatsApp.*

P6 also used WhatsApp:

P6: *WhatsApp. I have groups for both groups of learners for the rotational model ... I share information such as time tables and scopes ... Both by using voice notes and pictures of procedures.*

With Question B.3 I tried to determine whether any monitoring and evaluation of the content placed on the digital platforms were done. This was coded as internally, externally and none. The majority of the participants stated that this was done internally, either by the teacher, the head of department or the school. P1 and P4 noted external monitoring and evaluation by the GDE and parents, respectively. However, P3 disagreed and stated: "*None. One cannot judge if learners are participating and no checking on learners can be done.*"

In Question B.4, participants were provided with a list of possible problems that they believed were experienced by learners regarding the digital technology delivery systems that possibly prevented effective teaching and learning. All participants (100%) believed that the cost of data was the biggest problem, followed by a lack of support in the home or from parents (92.9%) a lack of computer or other devices, financial problems, a lack of internet access at home (85.7%), a lack of infrastructure in their living areas, socio-economic problems (71.4%), and material is useless without access to printers (14.3%). In addition, P1 added: "*Lack of motivation*

*and children believe its pass-one-pass-all due to COVID.*"

A list of possible problems experienced by teachers regarding the digital technology delivery systems that possibly prevented effective teaching and learning was presented in Question B.5. Again, cost of data was rated as the biggest problem by participants (78.6%), followed by not being able to reach enough learners, so it was not worth the effort (71.4%), a lack of internet access at school (57.1%), a lack of support from school or department (50%), a lack of internet access at home (42.9%), a lack of devices (35.7%), financial problems (35.7%), and a lack of infrastructure (26.7%).

In Question B.6 participants were requested to name the single biggest problem that learners experienced with digital technology systems. Financial problems (57%), lack of resources and infrastructure (28%), and a lack of skills and feedback (both 7%) were listed.

When asked to name the single biggest problem that the teachers faced (B.7), a lack of learner participation (35%), a lack of finances and a lack of resources (both 28%) were noted, while one participant (P4) indicated that he/she did not experience any problems.

When asked to provide a solution to the problem for themselves (B.8) and the learners (B.9), participants noted that the school's and/or education department's assistance for themselves would be valuable in the form of providing a platform, material, apps and workshops:

P1: *Have a general platform that ALL learners can use.*
P2: *Training on math app, e.g. Geogebra.*
P6: *I'd prefer to be able to run my digital platforms from my classroom, as opposed to my home. I would be able to make my online resources a lot more efficient if it could be done in conjunction with my daily classes. If for example, I could run a Zoom or Ms Teams session while having a class, having one half present in class and the other half present digitally. Or making a recording of the lesson available for download.*
P8: *More digital learning material should be available.*
P9: *A clear and directed workshop of how we can use different features while presenting lessons.*

Assistance by the school or department to provide resources such as apps and tablets for learners was highlighted as a solution for learners, followed by the provision of data packages, as noted in the following comments:

P2: *Apps where learners can write responses.*
P8: *If the school could have a database/server that learners could access, that has all the relevant information for their specific grade and subjects ... that learners can access and download while at school ... more learners would be a lot more eager to participate in the learning process if they had these resources.*
P10: *Tablet as a school essential.*

Section C: Policy and Planning

When questioned on the policy measures or responses that were put in place by the school to deal with health issues and the prevention of COVID-19 (C.1), the majority of the participants (92.9%) were satisfied that the appropriate measures were taken for sanitising and equipment. However, only 50% of the participants believed that social distancing had been addressed adequately. In Question C.2 participants were requested to describe any policy and planning measures or responses that were put in place to deal with the COVID-19 challenges relating to teaching and learning (C.2). The majority of responses (50%) indicated timetable changes, followed by changes to class sizes (35%) and then content changes (26%). Only one participant (P6) noted that digital technology platforms were in place.

In response to the final open-ended question (C.3) participants were required to state what problems or challenges they believed should be addressed in policies and planning to assist in future pandemics or emergency situations. They were also requested to make any further comments that they felt should be included. Three themes emerged from the answers, namely the number of learners in the classrooms, the large volume of content and updating technology. The participants commented as follows:

> P3: *... better technological facilities, screens for protection between learners ....*
> P6: *... I also believe that a thorough review of syllabus and subject matter is necessary, irrespective of pandemics or emergencies, as having such a large syllabus is detrimental to the performance of the learners. Not everyone is suited to university.*
> P8: *More teachers should be appointed and number of learners per class should be reduced.*
> P14: *Most public schools were already over populated before the pandemic.*

This research provides insight into the phenomenon of the COVID-19 pandemic and the use of digital technology for online learning. In the study of a secondary school in Gauteng, the participants (teachers) taught Grade 8 to 12 learners, but not all the different subjects. There appeared to be minimal use of diverse online learning platforms, but all teachers used WhatsApp to keep in touch with the learners. However, the biggest problem identified was that the teachers did not reach all the learners, which makes online learning problematic as it should not disadvantage some learners.

The participants identified exorbitant data costs and a lack of support from parents as reasons for preventing online learning for learners, while data costs were also identified as problematic for teachers. While there appeared to be internal supervision from the school on work loaded onto the digital platforms and for online assessments, supervision from the relevant education department and parental supervision were lacking. Socio-economic problems resulted in a lack of devices and data, while infrastructure was problematic for both the learners and teachers. Teachers highlighted that the lack of learner participation created a hindrance in online learning. The assistance of both the school and the GDE was highlighted as essential to ensure the use of effective digital technologies for online learning.

Even though the Minister of Basic Education (Press statement by the Minister of Basic Education, Mrs Angie Motshekga, MP on the basic education sector recovery plans for the reopening of schools, following the COVID-19 Lockdown adjustment of regulations, 2020:para. 18–20) announced plans for teaching learners at home and providing access to online support material, this did not seem to realise due to a lack of resources and infrastructure. The digital divide identified by Lembani et al. (2020), who note the lack of suitable access to digital technologies, appears to be a relevant problem in dealing with online learning. However, further studies would be needed to investigate the difference between urban and rural distance education, as this was a single case study on a school in an urban area. In addition, with this study I confirmed UNESCO's (n.d.) identification of problems in Africa, which appear to be valid in that there was a shortage of access to online teaching resources.

Regarding policies and planning, it emerged that the COVID-19 protocols were being followed for health and safety; however, social distancing appeared to be a problem. Even though measures such as timetable changes, smaller classes and content adjustments were made during the pandemic, it is disconcerting that only one participant noted that something was done to promote online learning and the use of digital technology. However, the need to address this issue in policy and planning was highlighted, together with addressing the issue of large classes, which was a problem prior to the pandemic, as well as irrelevant and/or possibly unnecessary content.

In SA, the problems facing education because of COVID-19 required pragmatic rather than theoretical approaches. Theoretically, global technological changes should allow for online teaching and learning but this case study has shown that the reality of the situation is not that simple – if a quintile 5 school demonstrated minimal use of digital technology since the first SA lockdown to the date of the study, the question arises of how school with lower quintile rankings are faring.

The single case study approach prevents the generalisation of the results for all schools in SA. Further studies should include other provinces and schools from all quintiles (quintile 1 to 4 schools). Private schools could also be included in future studies regarding:

- Use of digital technology – the difference between self-funded private schools and government-funded schools to understand inequality in the education system.
- Use of online learning platforms – the need and use of online learning platforms in private schools, compared to public schools as lockdown restrictions differed for these school, compared to government schools.
- Access to resources – are private schools technologically more advanced and better able to conduct online learning than public schools?

## Conclusion

The purpose of this case study was to examine and understand the challenges related to the use and accessibility of digital technology faced by teachers as a result of COVID-19. The data gathered enabled me to identify the difficulties encountered by teachers in the selected school, while also uncovering numerous problems that arose due to the education system's unpreparedness for the sudden shift to online learning. This emphasised the importance of continuing with online, hybrid or blended learning to address potential future challenges in similar crises. This pandemic has provided valuable insights and it is evident that the future remains uncertain. However, adopting a forward-looking perspective will aid in mitigating potential issues in future.

The following recommendations are proposed to enhance ongoing access to digital technology in teaching and learning during future crises:

- Using a pragmatic rather than a theoretical approach
- The GDE engaging with data suppliers to supply data to learners, possibly on the same system as the quintile system with school in lower income communities receiving a better price or more data
- A dedicated GDE database that acts as a centralised platform for all public schools, functioning as a hub for classroom content delivery and employed for the presentation of educational materials, offering learning access to study notes and videos
- Improving the infrastructure within schools to assist teachers to conduct online learning from their classrooms and classifying online learning as an essential service during pandemics or other crises
- Ongoing use of blended and online learning in the classroom and restructuring the curriculum to include online learning opportunities
- Upgrading the ICT facilities in schools to cope with the use thereof and problems that arise
- Ongoing training for teachers and learners
- Encouraging investment in digital technology and infrastructure in education and the country.

By implementing these recommendations, government and educational institutions can be better prepared to navigate future crises and ensure equitable access to digital technology for effective teaching and learning, while striving to bridge the digital divide in the country.

## Notes

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