Digital transformation and post-Covid-19 education in South Africa: a review of literature

Silence Chomunorwa[a] iD, Emely S. Mashonganyika[b] iD, Andrew Marevesa[c] iD

[a] University of the Western Cape, South Africa
[b] University of Cape Town, South Africa
[c] Cape Peninsula University of Technology, South Africa

ABSTRACT

Little thought or speculation was given to the possibilities of digital transformation for basic education until the global Covid-19 pandemic acted as a catalyst for digital transformation in education. Given the global trends toward digital transformation of teaching and learning, the South African basic education system has not been spared. While South African education policy was put in place to drive digital transformation, challenges persist in its implementation. The aim of this study was to examine the challenges that the South African basic education system faces in digital transformation and assess the strategies that can be used to mitigate these challenges. Although South Africa is attempting to address existing inequalities and the digital divide stemming from apartheid policies, the inequalities of the post-apartheid era have continued and worsened during the pandemic, resulting in a multi-layered digital divide that hinders quality and inclusive education. We adopted a narrative literature review in this study, focusing on previous studies that focused on ICT adoption, digital transformation, and inequality challenges in the South African education system. The findings make apparent the impact of the digital divide and former policies in perpetuating educational inequality. From the literature, strategies to mitigate the challenges are highlighted, including consultations.

Keywords: Digital divide, digital transformation, inclusive education, post-Covid-19 education

Categories: • *Applied Computing ∼ Education, e-Learning*

1 INTRODUCTION AND BACKGROUND

The suspension of face-to-face learning through state-mandated closures due to the 2019 coronavirus disease (Covid-19) has led to a redefinition of teaching and learning approaches (Zhao & Watterston, 2021). The Covid-19 pandemic has clearly acted as a catalyst for digital

transformation in education (UNICEF, 2020). In March 2020, approximately ninety percent of the global student population was affected by government-mandated school closures and other key sectors of the economy. The pandemic forced educational institutions to offer virtual teaching and learning as a substitute measure for national closures (Ofusori, 2021). The impact was worst in developing countries, as most failed to transition to digital teaching and learning. In South Africa, most schools suspended teaching and learning, except for privileged students attending well-equipped schools whose population is very insignificant. Major challenges in the country include poverty, lack of resources, cost of access, lack of technical skills among teachers and learners, lack of equipment to navigate the digital world, and poor or nonexistent networks. South Africa, like many other sub-Saharan African countries, has experienced economic problems since the turn of the millennium that have led to challenges in digital technology investment efforts, resulting in a serious digital technology deficit in the region (Letseka, 2016). In Zimbabwe, for example, the ratio of learners to computers was 1:32 in 2019. In addition, most of the prevailing traditional teaching and learning methods were already outdated, and the Covid-19 crisis has helped to disrupt this system and pave the way for the long overdue digital education system. Most institutions would have continued with traditional face-to-face instruction without plans to implement modern, technology-based instruction aligned with the global sustainable development goals (SDG). Although Covid-19 has proven to be a threat to human life, it has succeeded in pushing the boundaries of digital transformation. It has also highlighted the digital divide between developed and developing countries, rich and poor, in terms of quantity and quality of education received. From this literature, it can be inferred that the coronavirus pandemic has paved the way for the digital transformation of the education system, which is necessary to shape a future towards Society 5.0.

Digital transformation can be viewed as a process of technology adoption and acceptance that requires careful analysis of challenges and continuous engagement with them at each stage (Meyer & Gent, 2016). Like any other change, digital transformation can be voluntary or inevitable. The current Covid-19 pandemic made it inevitable for capable institutions to transform into the digital space to ensure academic continuity (David et al., 2020; Mhlanga & Moloi, 2020). Given the technological evolution and changes in industry, business and society, it is essential for education to evolve in a way that ensures its relevance. The digital transformation of education involves a shift from traditional pedagogy to more learner-centered, technology-driven learning with enhanced teaching and learning experiences (Osmundsen et al., 2018). It is important to keep in mind that education is a critical component of the United Nations Sustainable Development Goals (SDGs) and key to achieving many other SDGs. The goals of the SDGs are similar to those of Society 5.0, and the two reforms share a common direction in the vision of a new world. If people receive quality education, they can break out of the cycle of poverty, reduce inequalities, and achieve gender equality to create an inclusive society.

1.1   Purpose of the study

The purpose of this study is to highlight the challenges of digital transformation in South African education and suggest strategies to remedy them. This paper explores approaches that can be used to guide education through blended learning methods that promote an inclusive education system. The inclusive basic education system has the potential to address learners' needs and equip them with the necessary skills and attributes to contribute positively to society, leading to the realisation of Society 5.0. The contribution of this study is to provide a universal framework for the driving factors that enable the transition to digital education. By promoting digital technologies in the education system, it is possible to create a society in which all people, regardless of gender, age, or disability, can lead fulfilling lives and fully develop their abilities. A combination of face-to-face and online instruction leads to high-quality teaching and learning experiences. All categories of learners - elite, middle class, and poor - should receive the same quantity and quality of education across the region. The likelihood of a return to what we used to call normal is uncertain. Therefore, we must work with the new norm and develop strategies that can improve the forms of learning used during the pandemic. Above all, promoting inclusive education ensures the achievement of global sustainable development goal number four (SDG4), which aims to ensure inclusive and impartial quality education and promote lifelong learning opportunities for all. Therefore, exploring strategies to improve education is an investment in the future development of the country.

1.2   Research question

This study reviews literature on the challenges faced by the South African education system as it strives for digital transformation, which has been accelerated by Covid-19 pandemic. It therefore answers the following research question:

> *"What are the digital transformation challenges facing the South African education system against the backdrop of Covid-19?"*

2   THEORETICAL FRAMEWORK

The study draws on the theory of the digital divide as a framework for the research. The digital divide theory assumes that there is an economic and social gap between a nation's population and its access to information and communication technologies (Pick & Sarkar, 2016). Digital transformation of education depends on individual adoption and acceptance of various educational technologies as well as access to and availability of appropriate resources. This paper is theoretically based on Van Dijk's digital divide theory (van Dijk, 2005). According to this theory, the main stages of the digital divide arise from the areas of economy, usability, and empowerment. Pick and Sarkar (2016) postulate that the digital divide is not just a lack of accessibility but goes beyond ICT access and considers the associated social and economic participation. Research proves that digital transformation can only be realised if appropriate

resources are available, and people are empowered with the required skills and knowledge to use the resources. While the South African government has put systems in place to address the provision of technological resources to schools, a lot still needs to be done to address other challenges of the digital divide. This makes it particularly appropriate to base this study on digital divide theory.

3   METHODOLOGY

Literature review involves the use of database searches to retrieve information that contributes to theoretical discussions of topics of interest. Narrative literature reviews provide readers with current information on a specific topic. Unlike systematic reviews, narrative reviews do not follow specific inclusion and exclusion evaluation criteria, nor restrict the search to selected databases. This study makes us of a narrative literature review to critically evaluate studies on digital transformation in South African education. This study focuses on the challenges, opportunities, and strategies to mitigate the challenges of digital transformation in the South African public education sector using secondary data sources. The review focused on identifying challenges encountered in the implementation of digital learning in primary and secondary education. Synthesis of the selected literature led to the generation of opportunities and mitigation strategies that can be used as a reference for digital transformation in education. The goal of the study is to provide readers with a descriptive overview of digital transformation in South African education.

3.1   Search and selection

The search criteria used to identify the literature was based on time frames, search terms, and search strategies. Recent literature from a variety of sources was used, without restricting to specific databases. Furthermore, both electronic and paper-based articles were used. This study therefore drew on published research and reports on the use of technology in South African schools. The goal was to find a set of articles that:

1. focus on the challenges of ICT adoption, implementation, or use by public schools in South Africa,

2. discuss educational inequality in South Africa, and

3. mention digital transformation in South African schools.

Publications focusing on the same aspects but in other countries were excluded. To ensure that the study reports on current issues, only recently published sources were used.

3.2 Literature analysis and synthesis

Analysis of the findings focused on summarising and analysing existing literature on digital transformation, including challenges, opportunities and coping strategies. Moreover, a critical view on the South African socio-economic status, and perspectives of educators, learners, and stakeholders on the use of technology in education was done. Attention has been given to government efforts and discourses around the implementation of the e-education policy of 2004 (DoE, 2004). The aim was to provide new insights that will contribute to policy making, future research and facilitating a conscious digital transformation in education to achieve an inclusive education system. A deductive approach was used to come up with strategies to mitigate the challenges, and hence facilitate digital transformation.

4 FINDINGS AND DISCUSSION

4.1 History of South African education

South Africa invests a significant amount of money in education (Macha & Kadakia, 2017). Macha and Kadakia (2017) also note that the country's education system has never fully recovered from the 1953 Bantu Education Act, which aimed to disenfranchise the country's majority black population from both the political and economic systems. The act deliberately aimed to turn blacks into subservient workers. It also systematically excluded black students from instruction in certain subjects. The effects of the discriminatory education system continue to this day, not least in terms of the quality of instruction provided by a generation of teachers who were themselves trained in an inferior system.

4.2 Transformation

It is widely recognised that in a future globalised world, traditionally valued skills and knowledge will become less important and a new set of skills will become more dominant and important (Hennessy et al., 2010; Pozo et al., 2021). Although the details vary, it is generally agreed that repetition, pattern prediction and recognition, memorisation, and all skills related to information gathering, storage, and retrieval will become less important due to artificial intelligence (AI) and related technologies (Damerji & Salimi, 2021; Ramlall, 2020). On the rise is a set of contemporary skills that include creativity, curiosity, critical thinking, entrepreneurship, collaboration, communication, growth mindset, global competence, and a variety of skills with different labels (Voogt et al., 2013; Zhao et al., 2021). For humans to succeed in the age of intelligent machines, they must not compete with the machines. Instead, they must become more human. Being unique and being endowed with social-emotional intelligence are distinct human qualities (Zhao, 2017) that machines do not (yet) have.

4.3   Challenges and mitigating strategies

The overall goal of education is to equip learners with knowledge and skills for the changing world that will enable them to contribute positively to society (UNICEF, 2021). South Africa has the potential to transform its education system and improve access to education for all citizens. The education system needs to be transformed to serve a new social order, meet pressing national needs, and respond to new realities and opportunities. However, this potential has not yet been fully realised due to existing challenges, which may be categorised into the three stages of digital divide, according to van Dijk's (2005) digital divide theory.

4.3.1   Economy

Inequality   The main challenge facing the country's education system is to address past inequalities manifested by the former regime's discriminatory policies along racial lines. These challenges were exacerbated by the pandemic of the coronavirus, which promoted digital transformation through virtual teaching and learning. Nevertheless, the society driven by digital transformation has exposed many people, especially in sub-Saharan Africa, to another poverty called information poverty (Mascarenhas, 2010; Pick & Sarkar, 2016). The South African education system has been classified into several categories: geographic access, intellectual access, digital anxiety, skills access, and material access that promote or hinder inclusive and equitable education. Already marginalised teachers and learners have failed to adapt to new virtual learning and blended forms of education. South African learners, especially those from rural areas and disadvantaged families, are lagging in terms of knowledge acquisition.

Lack of resources   To date, the South African education system is characterised by dingy schools with inadequate furniture, space, and equipment; high dropout rates; high teacher turnover; declining government financial support; and low efficiency and productivity of teaching and learning in schools (Adams et al., 2020; Meyer & Gent, 2016; South African Government, 2016). Some rural schools do not have power to support digital transformation and other technological devices, leaving traditional teaching and learning models as the only form of instruction in such contexts (Konyana & Konyana, 2013). Over the past decade, there has been a massive increase in the number of students due to rising birth rates and an influx of foreign immigrants, further straining already scarce human and material resources. These challenges have widened South Africa's digital transformation gap.

Although digital transformation has bridged the geographic gap between learners and educators, it has again widened the existing digital divide, leading to new barriers to the divide. These include gaps in the infrastructure for using digital technologies in education, particularly between rural and urban schools, which differentiate the privileged from the underprivileged. Other issues include lack of Internet access in poor communities, lack of technical skills among teachers and learners, lack of equipment to navigate the digital world, poor or nonexistent networks, and brain drain that strains the teaching profession. Unaffordable costs of establishing

adequate infrastructure, compounded by the lack of qualified technical support, pose a challenge to the education system.

4.3.2   Usability

Language issue   According to Ofusori (2021), challenges that are often overlooked in the South African education system include the language barrier, as English dominates the digital space even though it is not the native language of the locals, which prevents both learners and teachers from effectively engaging in digital transformation that meets global standards. In addition, software applications are developed according to Western models and sometimes do not consider local cultural characteristics. In this regard, it is important for the government to develop digital content in local languages.

Technological shortcomings   The main problem with the transition to the digital space in education is that the focus is on technological capabilities rather than on the needs of learners (Letseka, 2016). The potential of digital technology is caught between the growing pressure on the education system to socially transform society to meet South Africa's global standards and skill requirements, and the diverse academic conditions, large class sizes, pandemic of coronavirus, and multilingualism currently seen in these teaching and learning contexts (Zhao & Watterston, 2021). There are also misconceptions that view virtual learning as distance learning, rather than as a shift to the digital world, leading both teachers and learners to resist digital transformation.

4.3.3   Empowerment

Skills and knowledge shortage   Teachers lack the skills and knowledge to address the diverse needs of students. Therefore, a framework should be established to equip teachers with the appropriate skills (Chataika et al., 2012). Teacher education programs are not keeping pace with technological advances, which leads to an imbalance in teaching and learning progress. Therefore, teacher education requirements need to be rethought to align with global development standards (Zhao & Watterston, 2021). The digital divide can best be mitigated by aligning human resource development and technical infrastructure to ensure that new technologies provide expanded, equitable access to improve educational opportunities for all, not just the technologically privileged (Jantjies, 2020; Sun et al., 2020; Tondeur et al., 2016).

Consultations   Several commissions have been established to support and improve the integration of digital technologies in teaching and learning (United Nations, 2020). Therefore, the recommendations of these commissions need to be effectively implemented to be globally competitive. The South African government should encourage the use of free apps and educational websites, open educational resources, and the tremendous adoption of various educational technologies for distance learning.

The current situation shows that South Africa will not be able to achieve Sustainable Development Goal 4 (SDG 4), which is to ensure inclusive and equitable quality education and lifelong learning opportunities for all by 2030. It is important to keep in mind that education is a critical component of the United Nations Sustainable Development Goals (SDGs) and key to achieving many other SDGs. From this literature, it can be argued that the South African education system needs to be carefully revised to achieve equitable and inclusive education that meets global standards. Strategies should be developed to mitigate challenges in the education system, some of which have been highlighted by the Covid-19 pandemic.

Overall, there is need for a social justice approach to education that will help addressing segregation practices that exist within the system. The education design strategies should aim to disrupt the existing hegemonic worldviews that do not consider the diversity of circumstances of learners in South Africa and allow all students to match their individual ways of learning to varied approaches of engagement, expression of learning and intellectual representation.

4.4 Recommendations

While there is still a need to help students develop basic practical skills, education should also be about developing the humanity of citizens in local, national, and global societies. Zhao and Watterston (2021) agree with this when they recognise the rise of education through contemporary skills such as creativity, global competence, and critical thinking. Education must be seen as a pathway to lifelong learning, satisfaction, happiness, well-being, opportunity, and contribution to humanity.

For the post Covid-19 era, curricula must be developed to meet the needs of students by helping them develop the new skills of creativity, curiosity, critical thinking, entrepreneurship, collaboration, communication, and growth mindset. In addition, it is imperative that the curriculum focuses on teaching students' creativity, entrepreneurial thinking, and global competency to succeed in the age of smart machines and globalisation.

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