Implementation of South Africa's Education Policy in ICT: Through an Access and Equity-Oriented Lens

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Abstract: Digitalisation has emerged to challenge traditional educational hierarchical structures and paradigms to revolutionise the education sector. Despite the enormous opportunities and ubiquity of information and communication technology (ICT) in the business sector, the integration of digital tools in the education sector occurs outside the pedagogical principles of inclusive teaching and online learning, and digitalisation remains an 'add-on' in the school curriculum. Through access and equity-oriented lenses, this article takes a broader perspective to explore the intersection of education and technology, and the ICT in education policy implementation in South Africa's nine provinces. The intersection of access and equity acknowledges the dominance of techno-utopian rhetoric outside of the social, context, and cultural systems because of the unresolved dichotomous realities of the 'haves' and the 'have-nots' in the nine provinces in South Africa. ICT is often perceived as a catalyst for change in access, equity, and the expansion of the boundaries of the classroom. However, this rhetoric has been associated with significant investments in digital devices, which is divorced to the realities of South Africa, which is characterised by multifaceted inequalities. ICT implementation in the education sector in South Africa is very low, and there is a dearth of studies interrogating the techno-utopian rhetoric. This conceptual study was achieved through a systematic Google database search using Braun and Clarke's thematic analysis approach. The findings highlight the fragmented implementation of ICT in the inequitable provinces, give insights into contextual factors that impact the pedagogical integration of ICT in teaching and learning, and illuminates the cracks in the digitalisation agenda as detailed in the *National Development Plan 2030*. In addition, the techno-utopian rhetoric on digitalisation in education creates unfair judgement on ICT in education policy implementation in an unequal context. Moreover, the high prices of digital devices and data hinder equitable access to digital education and services, which undermines digital inclusion in South Africa. Lastly, there is a clear relationship between provincial characteristics and the implementation of ICT in education policies in schools.

***Keywords**:* access; equity; digitalisation; inequalities; South Africa; ICT

1. Introduction and Background

The fabric of digitalisation in the education sector in South Africa reflects the Republic's multi-coloured flag, and the implementation in different provinces is full of potholes. Meyer and Gent (2016) confirmed that information and communication technology (ICT) "implementation is slow and uncoordinated, and specific resources and capacity are insufficient to ensure successful implementation" (p. 13). However, in the absence of "clear guidelines and integrative strategies" (Meyer & Gent, 2016, p. 13), these potholes slow down the implementers to reflect on the one-size-fits-all approach in an unequal society to come up with context-specific approaches. In South Africa in particular, systematic inequalities are prevalent, and therefore, the intersection of access and equity addresses power differentials in rethinking education. In recent years, a growing propensity to accept ICTs as an educational solution has been observed in South Africa (Dlamini & Coleman, 2017; Moll, Dlamini, Ndlovu, Drennan, Nkambule, & Phakathi, 2022). Research into the digital readiness and skills profiles of teachers revealed a digital knowledge gap across schools in South Africa (Dlamini, 2022a). Hence, the intersection of education and technology reflects two different worlds (Baroud, 2020; Zenda & Dlamini, 2023).

This is despite the fact that digital access and educational equality are fundamental to inclusivity and equitable learning experiences.

Many studies identified the factors behind the dichotomous reality of the 'haves' and the 'have-nots' in the South African context (Dlamini & Ndzinisa, 2020; Moonasamy & Naidoo, 2022), especially after the COVID-19 pandemic. The digital and educational inequalities contributed to the disparities in teaching and learning experiences during the pandemic. According to Zenda and Dlamini (2023), the "extremes of poor and rich demonstrate the inequality found in our education system and society" (p. 83). Dlamini (2022b) confirmed that the "inconsistent access to digital resources in schools result in social disparities" (p. 40). Van Deursen and Van Dijk (2019) concluded that "the ongoing expenses required to maintain the hardware, software, and subscriptions affect existing inequalities related to Internet skills, uses, and outcomes" (p. 354). This means that the digital divide has moved beyond the unequal distribution of physical digital resources to material access, which includes the means required to maintain and support digital resources.

With the acute digital divide in South Africa, digital transformation is a distant reality (Moonasamy & Naidoo, 2022). The digital divide is a wicked problem hindering the implementation of digital pedagogies. The digital divide refers to the "inequities among individuals who have access to technology and opportunities to learn ICT skills" (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008, p. 1648). Digital pedagogies are an important factor in the reconceptualisation of boundaries of education. Jantjies (2020) averred that South Africa's digital divide is a result of limited access to digital devices, digital fluency, and internet affordability. Moreover, the current paper took a much broader perspective on the digital divide, beyond computer access, and engaged with the "important set of complementary resources and complex interventions to support social inclusion" (Warschauer, 2003, p. 7). Therefore, based on the principles of access and equity, ICT-enabled education could mitigate education disparities, especially in rural and resource-constrained sections of South Africa.

It is becoming clear that the acute digital and education divide in South Africa is multi-layered, and that this reinforces the unequal distribution of digital and educational resources. Crooks (2022) described the digital divide as "any correlation between socially consequential difference (e.g., race, class, sex, age, disability, geography, citizenship) and access to many kinds of computing resources" (p. 2). Byrum (2023) provided an example of the digital divide as those who "do not have access to, or cannot afford, reliable broadband service and internet-enabled devices" (p. 193). In South Africa, digital equity is a challenge, yet digital access is confirmed as a means to achieve economic, political, and social equality (Botha, 2016; Byrum, 2023). From a pedagogical perspective, computing devices in South Africa were oversold to the education sector but were not central to pedagogical activities.

Naidoo and Rasool (2021) confirmed that in 2014, "the Gauteng provincial government signed a contract with Huawei to provide 88 000 tablets to 2 200 beneficiary schools" (p. 172). The need to serve learners with inclusive educational opportunities is significant (Mhlongo, Mbatha, Ramatsetse, & Dlamini, 2023) but 'putting the cart before the horse' is not the solution. Despite the affordances of digitalisation in the business world, digital technology is still an add-on in the education sector. Importantly, fundamental educational issues must be considered, and hence, Watson (2001) argued for "pedagogy before technology" (p. 251). Liasidou (2023) postulated that "the seismic changes that ensued in terms of digitizing the process of teaching and learning should be the harbinger of a new educational reality" (p. 8), whereby inclusivity is central to teaching. However, in order to move away from the techno-utopian rhetoric, the intersection of digital and social pedagogy is critical to expand the boundaries of education access.

As a result, to ensure inclusive teaching and equitable access to educational cultures and systems, there must be a combination of pedagogical strategies and ICT support (Bernhardsson, Hult, & Gellerstedt, 2017). However, it is critical to reduce the gap between pedagogical practices and ICT in education policies. Hence, the objective of this paper was two-fold: Firstly, it analysed ICT in education policies in South Africa and the patterns of policy change, and secondly, it analysed the extent to which policy responses vary among the nine provinces in South Africa. The focus of this paper was to engage with the idea of rethinking education based on the proposition of digitally enhanced education in order to create equitable learning experiences. Focusing on South Africa, there is evidence that the government prioritises ICT in education, but providing access to digital resources alone pushes historical disadvantaged groups to the periphery of computing culture. Against this backdrop, this research raised the following research questions:

2. What is the relationship between provincial characteristics and the implementation of ICT in education policies in schools?
3. To what extent are the existing inequalities affecting the implementation of ICTs in education?

The Context

South Africa is a diverse cultural and multilingual state that is divided into nine provinces and has 12 official languages, which contribute to the rich mosaic of the Rainbow Nation (Dauncey, 2024). These 12 national

languages are IsiZulu (24.4%), IsiXhosa (16.3%), Afrikaans (10.6%), Sepedi (10.0%), English (8.7%), Setswana (8.3%), Sesotho (7.8%), Xitsonga (4.7%), SiSwati (2.8%), Tshivenda (2.5%), IsiNdebele (1.7%), and Sign Language (0.02%; Fraser, 2023). Interestingly, Blignaut, Hinostroza, Els, and Brun (2010) asserted that "language is an obstacle for South African schools for ICT implementation in teaching and learning" (p. 1553). English is the instructional and business language in South Africa, yet the majority of the 63 million people are black Africans (81.4%), Coloured (8.2%), White (7.3%), Indian/Asian (2.7%), and other (0.4%) the World Factbook 2024[1]. Given the diversity of the country, policies have been developed to coordinate developments and ensure efficient delivery of services at provincial levels. However, this article focuses on national ICT policies.

In the *National Development Plan 2030*, ICT was deemed an enabler to achieve sustainable development (National Planning Commission, 2012). Hence, the reasoning behind this study was that ICT is an important development paradigm, and therefore, there is a correlation between maximising access to ICT and economic development (Ofori & Asongu, 2021; Tchamyou et al., 2019). According to Ofori, Osei, D and Alagidede (2022), "ICT skills, access and usage induce inclusive growth in Sub-Saharan Africa" (p. 1), and hence, the "lack of ICT materials in our contemporary world is a form of social deprivation" (Ofori et al., 2022, p. 2). However, it is necessary to have a solid understanding of digitalisation by states to better articulate their ICT policies agenda in the education sector.

National ICT Policies in Education

While policies and strategies on ICT in education exists in South Africa, the implementation has been very slow in the nine provinces, especially those characterised as rural and poverty stricken. According to Meyer and Gent (2016), "access to technology is limited and unequal across provinces and quintiles" (p. 1). This is despite the *White Paper on e-Education* of 2004 (Department of Education [DoE], 2004), the *Guidelines for Teacher Training and Professional Development in ICT* (DoE, 2007), the Department of Basic Education's (DBE, 2011) *Action Plan to 2014*, the *National Integrated ICT Policy Green Paper* (Department of Telecommunications and Postal Services, 2014), *Action Plan to 2019* (DBE, 2015), the *Professional Development Framework for Digital Learning* (DBE, 2018) and *Action Plan to 2024* (DBE, 2020). This was an effort by the government to introduce ICT tools as an alternate pedagogical tool to the traditional classroom.

The *White Paper on e-Education* (DoE, 2004) policy was introduced into schools with the intention of transforming pedagogical activities and learning. However, the biggest challenge in South Africa is that most learners come from disadvantaged schooling and poor socio-economic backgrounds (Dlamini, 2022b; Dlamini & Dewa, 2021). Ostrowick (2018) confirmed that the Operation Phakisa Lab process identified five broad categories that must be addressed for a successful rollout of ICT tools in education, namely digital content, connectivity, devices, teacher training, and e-administration. The basic tenets of the *White Paper on e-Education* (DoE, 2004) were "transforming learning and teaching through information and communication technologies" (p. 3), "providing modern technologies to schools in order to enhance the quality of learning and teaching" (p. 6), and "every South African learner in the general and further education and training bands will be ICT capable by 2013" (p. 17). This meant that by 2013 all learners should have been "us[ing] ICTs confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community" (DoE, 2004, p. 17). However, the equitable distribution of digital education resources remained a challenge, and in 2020, during the COVID-19 pandemic, inequalities were visible throughout the country.

The second policy is the *Guidelines for Teacher Training and Professional Development in ICT*, which identified the ICT knowledge, skills, values, and attitudes required by teachers to effectively implement the national curriculum (DoE, 2007). To enable the ambitious *White Paper on e-Education* (DoE, 2004), this policy provided the details of the skills necessary to achieve the implementation of e-education to "redress inequalities and improve the quality of teaching and learning" (DoE, 2007, p. 1). The intersection of the two policies (DoE, 2004, 2007) is indicative of access-based solutions, also known as "ahistorical and technologically deterministic" (Chundur, 2017, p. 1386). Without considering the social inequalities created by the historical injustices of the past, accessed-based solutions are bound to fail. The third policy is the DBE's (2011) *Action Plan to 2014*, which encapsulates the *National Development Plan 2030*'s priorities towards the realisation of schooling 2025 to improve and diversify learning to a large degree using ICT as an enabler (National Planning Commission, 2012). Some of the goals of *Action Plan to 2014* is improving the computer literacy of teachers, access to computers by learners, and improving access to important information via the e-Education strategy (DBE, 2011).

1 https://www.cia.gov/the-world-factbook/about/archives/2023/countries/south-africa/

The fourth policy is the *National Integrated ICT Policy Green Paper* (Department of Telecommunications and Postal Serves, 2014), which prioritises access to ICTs for low-income users and resource-constrained communities. This policy focused on addressing historical inequalities in access to basic services, including access to new ICT to "reinforce the constitutional principle of equality and equal access to all communication services by all South Africans" (Department of Communications and Digital Technologies, 2020). The fifth policy is the *Action Plan to 2019* (DBE, 2015), which encapsulates the *National Development Plan 2030* priorities towards the realisation of schooling 2030 (National Planning Commission, 2012). This plan reiterates many of the priorities in *Action Plan to 2014* and is closely aligned with the *National Development Plan 2030*. The sixth policy is the *Professional Development Framework for Digital Learning* that focuses on educators "us[ing] Information and Communication Technologies to enhance teaching and learning" (DBE, 2018, p. 9) to "improve access, quality, equity, redress and efficiency" (p. 9). Lastly, there is the *Action Plan to 2024*, which is closely associated with COVID-19 pandemic and was "intended to guide the system, in part by explaining where the problems lie, and how the various solutions are interconnected" (DBE, 2020, p. 5). Evidently, redressing inequalities requires a combination of policies and systematic planning to transform social and professional practices. While acknowledging the potential of ICT in education, in times of unprecedented inequalities, the context is critical in order not to overestimate ICT affordances.

4. Theoretical Framework and Related Literature

The nature and complexity of reconceptualising the boundaries of education require a multidimensional understanding as this issue has far-ranging impacts on inclusive and quality education. Hence, the theoretical framework underpinning this paper was access and equity. Inclusive education is informed by equitable access, and reducing inequalities is dependent on educational equality. In the context of this study, access refers to people having equal opportunities to participate in an education system irrespective of their abilities (Aksu & Canturk, 2015), while equity "acknowledges the various needs of individuals" (Willems, 2019, p. 152). Moreover, equity is the creation of equitable opportunities and resource allocation aimed at the marginalised to better exploit social and economic opportunities (Tchamyou, Asongu & Odhiambo, 2019; Tchamyou, Erreygers & Cassimon, 2019). The intersection of access and equity results in inclusivity. Inclusivity is described in relation to "ensuring a basic minimum standard for all in the context of education" (Willems, 2019, p. 152). It follows that reducing inequalities through improved quality of education would likely facilitate access to various capitals. Consequently, gaining access to various social and cultural capitals would reduce social and economic disparities (Dlamini & Dewa, 2021).

To put this into perspective, the intersection of access and equity in the provisioning of ICTs creates a level playing field for the masses to participate in the economic activities of a state. The broader and more contextualised view of access and equity indicate that redressing inequalities requires a combination of policies and systematic planning to transform social and professional practices. The essence of inclusivity lies in the alleviation of digital inequalities and eradication of structural deficiencies in the public-school systems that are an impediment to educational equity. In this case, the notion of access requires shifting beyond equity to eliminate digital exclusion that results in economic chasms. Given that technological advancements have outpaced pedagogical practices, systematic interventions are a must to bridge the societal digital gaps arising from socio-economics disparities. ICT as an enabler and equaliser forging a symbiotic alliance between technology, curriculum and pedagogy is a must to pave a way for innovative instructional practices.

In contrast to South Africa's emphasis on digital devices, access is about getting equal opportunities and having the appropriate knowledge and skills to fully participate in the digital era. However, without the systematic interventions and implementation of ICT policies in South Africa, the current crop of educators and learners face a challenge because digitally related inequalities are likely to continue to be a major challenge in low- and middle-income countries. The simplistic view of ICT integration that overlooks the digital technological knowledge gap has a serious impact on contextual digital education solutions. In 2020, the pandemic exposed the extent and scope of digital disparities that engender inclusive and digital innovations (Dlamini & Ndzinisa, 2020; Olawale, 2024). Evidently, the rate at which South Africa develop policies does not correlate with the implementation outcomes. Though this research illuminates the potential of ICT in education, it is critical to understand the gaps that result in implementation constraints. It is important to balance the trichotomous alliance involving curriculum, pedagogy and technology. This argument leads to the objective undergirding this study: The implementation of ICT policies in the nine provinces in South Africa.

5. ICT in Education Project Implementation in South Africa

Achieving quality education and reducing inequalities is a priority in the *National Development Plan 2030* (National Planning Commission, 2012) and is aligned with the United Nation's Sustainable Development Goals 4 and 10[2], respectively. In the past 20 years, the national and provincial governments of South Africa initiated various ICT projects in education with the aim of introducing learners to basic computer skills, improving access to information, and producing computer-skilled university graduates (Dlamini, 2018; Dlamini & Na'Allah, 2015; Dlamini, Ojo, Makalela, & Perumal, 2024; Mpehle, 2011). A number of initiatives, such as Gauteng Online, SchoolNet South Africa, Khanya Project, Paperless Schools, and Intel Teach to the Future, have been launched in various provinces (Ndlovu, 2015; Na-Allah, 2019). These initiatives indicate the urgency with which the government wants to alleviate digital exclusion and achieve the *National Development Plan 2030* objectives, Sustainable Development Goals, and the *United Nations Agenda 2030*.

In the context of South Africa, to realise Sustainable Development Goal 4, equitable access to quality education is critical, especially to equip learners with relevant skills such digital competencies (Osborn, Cutter, & Ullah, 2015). According to Lim et al. (2020), ICTs "provide opportunities for education systems to achieve SDG [Sustainable Development Goal] 4 by creating better access to quality education, developing lifelong learning competencies, and streamlining education system processes" (p. 2448). Importantly, the interplay between digital access and equity provides educators and learners with opportunities to better exploit social, educational, and economic opportunities. However, "the lack of digital leadership is hampering visionary planning, excellence in professional practice, the creation of a digital age learning culture, and system improvement" (Tsoka & Kriek, 2024, p. 2). Most recently, the Gauteng Department of Education introduced what became a paperless classroom fantasy (Minty & Moll, 2020). The missing link in this project was the intersection of digital technologies with pedagogical curriculum delivery to improve the professional practices of teachers (Goosen, 2015).

The proliferation of digital devices in schools did not match professional development opportunities for educators to develop their technological knowledge (Dlamini, 2022a). Therefore, it was highly unlikely that teachers without the necessary "knowledge, skills and support needed for creating opportunities to integrate e-education into the curriculum" (Goosen, 2015, p. 52) were going to accept educational technologies in their professional spaces. In the financial year 2017/2018, the Gauteng Department of Education invested R724 million to continue the rollout of the 'classrooms of the future', and other provinces, such as Limpopo, continue to systematically invest in ICT teacher development (Dlamini, 2022a). The ICT teacher development programme in Limpopo intersects digital skills development and the provisioning of digital devices. In the Western Cape, the Khanya project was the ICT in education flagship project with the mandate to provide ICTs to all public schools in the province by the year 2012 (Mooketsi & Chigona, 2010). The Khanya project was meant to enable the use of technology as a pedagogical tool to transform teaching and learning. Next was the Telematic Schools Project, a joint initiative between the Western Cape Education Department and Stellenbosch University, intended to implement education through technology. Again, this was an effort by a provincial government to improve access to education across physical and socio-economic boundaries (Botha, 2018). Since ICT Operation Phakisa in Education 2015, progress have been made, but ICT policy implementation must be context-dependent and there must be an understanding of the social realities of the schooling sector.

The national ICT policies are the backbone for the achieving the e-education strategy, but they must be "based on valid assumptions and be suitable to implementation contexts reflecting the needs, understandings and social realities of primary beneficiaries" (Sehuhula-Mooketsi, 2016, p. vii). Beyond the social realities, ICT implementation is also dependent on technical, pedagogical, and professional development opportunities and continuous support. The high levels of inequalities and disparities in South Africa demand more than well-written policy documents to achieve digital equity. As such, the educational inequalities and social disparities in the nine provinces of South Africa require honest and meaningful participation from all sectors of the economy. The high levels of inequalities and digital exclusion in the different provinces in South Africa are a reality that compromises inclusivity and distributed socio-economic benefits. As alluded before, computing devices in South Africa were oversold to the education sector without equal investment in professional development opportunities and ongoing technical support. Nkengbeza, Mbuzi, and Chainda (2022) confirmed that integrating media technology into teaching and learning depends on training, access, and technical support, and Dlamini and Dewa (2021) argued for various social and cultural capitals. Sehuhula-Mooketsi (2016) explained that failure to implement such policies could be due to the "tendency to model policies on those from developed countries" (p. 28). Hence, it is necessary interrogate the experiences of ICT policy implementers and determine if they have the requisite skills to implement a complex and multifaceted policy.

6. Critical Approaches to ICT in Education Policy Implementation

2 https://sdgs.un.org/goals

It is critical to have purposeful and contextually informed interventions that challenge the dominant narratives to digitalisation in education. Munyanyo and Simuja (2024) confirmed that an effective digitalisation strategy "hinges on the interconnectedness of content, pedagogy, and technology that shapes instructional practices" (p. 3). In another argument, Nkengbeza et al. (2022) cited "infrastructure and network capacity requirements for proper functionality" (p. 4). Therefore, any argument alluding to policy development and implementation inadequacies in South Africa is flawed because it is a narrower view of the overall situation that does not have a comprehensive view of the socio-economic factors and context related variables involved in ICT integration in an unequal education sector.

This article agrees with the argument that the ICT value chain between government institutions and the public sector is the stumbling block to the realisation of the *White Paper on e-Education* (DoE, 2004). Despite policy issues, adverse inequalities and structural deficiencies in the public-school systems are impediments to meaningful ICT adoption and appropriation in the education sector. In rural and resource constraints provinces, there is a "high ratio of student to computer access inevitably results in sporadic use of computer technology which results in neither the teachers nor the learners getting adequate exposure necessary for either ICT-literacy or integration of information and communication technologies into teaching and learning" (Sehuhula-Mooketsi, 2016, p. 44). The high ratio of student to computer access is a result of inadequate digital infrastructure and limited funding resources. To a greater extent, the absence of cooperation between government and the private sector is a stumbling block, especially with the added costs beyond the procuring of devices.

7. Conclusion

This study adopted access and equity as dependent variables to, firstly, explain why the implementation of ICT in education in South Africa has been very slow; secondly, explain the revolution of ICT in education policies in South Africa; and lastly, explain the constraints in the implementation of ICT in the schooling sector. This analysis demonstrated that a successful and effective integration of ICT into education requires not only policies but also commitment from various stakeholders and contextual systematic interventions. There is evidence of provincial governments' weaknesses that lead them to avoid technological rationality while building ICT capacity and forming unique partnerships to deal with implementation challenges. This shows that it is necessary to recognise the significance of context beyond the enactment of ICT policy. The biggest challenge in the implementation process is the superficial understanding of these policies that de-contextualises the unique context of different provinces. Thus, in South Africa, it is critical to interrogate the experiences of ICT policy implementers to understand whether they have the requisite skills to implement a complex and multifaceted policy.

Actionable Recommendations

While the article comprehensively discussed the policies and the pedagogical affordances of ICT, finding a balance on the trichotomous alliance involving curriculum, pedagogy and technology will serve as a cornerstone for interdisciplinary perspectives in the ICT implementation initiatives. The notable limitation in ICT implementation lies in the 'one-size-fits-all' approach because the schooling sector represents a diversity of geographic contexts, and teachers and learners with differentiated abilities, limited digital resources, and ICT skills limitations. Therefore, there is a need for differentiated and systematic ICT professional development opportunities for educators and learners, and an equitable distribution of digital educational resources.

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