The Integration of Information and Communication Technology in Education: A Review of Policies and Practices in Angola, South Africa and Zimbabwe

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ABSTRACT

The use of Information and Communication Technologies (ICT) in education has expanded significantly worldwide. Many countries develop Educational ICT policies to promote national agendas for economic, social, and political growth. The implementation of ICT in education is designed to prepare students to assimilate into the global market, attain equal access to education, and to be technologically prepared citizens. Many African governments are therefore developing ICT policies to expand integration of ICTs in primary and secondary education. However, successful integration of ICTs requires concerted efforts across stakeholders, as well as consistency in policy implementation and evaluation. Although several Southern African countries have ICT policy blueprints for education, not much is known about the implementation of the policies on the ground. This study reviews educational ICT policy implementation, successes, and challenges in three Southern African countries: Angola, South Africa, and Zimbabwe.

KEYWORDS
Digitalization, educational policy, information and communication technologies, Southern Africa

The use of Information Communication Technologies (ICTs) in education has increased significantly during the last two decades. Educational ICT is paramount in transforming global education for both students with and without disabilities (Chaidi et al., 2021; Iniesta-Bonillo et al., 2013; Khetarpal, 2014). As educators and employees across the globe advocate for students to train with 21st-century skills, it is necessary to institute reforms in teaching and learning that prepare learners with these requisite skills (Ra et al., 2016). One way to increase students' academic outcomes is to increase their engagement in learning processes and encourage them to search for information as part of the knowledge creation process. ICTs serve as a good platform for students to search and find information. Through the use of educational ICTs, people with special needs are able to alleviate the challenges associated with accessing information.

For a long time now, there has been a big disparity in academic achievement between students with and without disabilities. According to Chitiyo and Wheeler (2004), children with disabilities in most African communities were historically marginalized from both social and learning activities, and in most cases, there was little to no advocacy to address these societal norms. The growth of ICT became a tool for social inclusion for these children. The continued growth of ICT has created a "culture of accessibility" that promotes educational inclusion for students with special needs/disability and prepares them to assimilate into the ever-changing technological world (Medina-García et al., 2021).

To help students prepare to assimilate into the economic, social, and political activities that incorporate technology,

most countries are consistently developing and re-evaluating national educational ICT policies. In Europe, the development of educational ICT policy is seen as a way to increase the integration and learning of students in both primary and secondary education (Ottestd & Guðmundsdóttir, 2018). Since the beginning of the COVIID-19 global pandemic, most face-to-face healthcare and educational services were suspended and transitioned to online platforms. In education, classes were increasingly conducted online. However, most students with special needs were negatively affected since several technological accommodations they would need were not available. In less developed countries (e.g., Southern Africa), several students with special needs were completely left out due to lack of necessary technological tools to accommodate them. The integration of assistive ICT is therefore critical for increasing the participation and inclusion of students with disabilities in learning (Chaidi et al., 2021).

Research on the development of educational ICT policies in Africa indicates little information on how students with special needs are addressed in these policies. What seems evident are the legal frameworks developed for education in general, but with no adequate reference to special needs education. To increase the inclusion of students with disabilities in national activities, Angola, Zimbabwe, and South Africa have developed national education policies with the underlying assumption that all students will benefit from the incorporation of technology into the education system. This assumption can be premised on the recommendations of the World Bank and the United Nations, that the use of ICT in the world's poorest countries will support development in economic and social spheres of life (Kozma, 2008). Research findings suggest that as ICTs are integrated into society, they allow for greater access to knowledge, inclusion, and independent living among people with disabilities (Khetarpal, 2014).

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In 2006, education ministers from African countries adopted a 10-year plan that promoted science, technology, and improved learning outcomes (Nhema & Zinyama, 2016; Tilya, 2008). More importantly, the promotion of technological integration in schools in African countries was aligned with the United Nations (UN) Strategic Development Goals on education (Tilya, 2008). One of the UN's eight National Development Strategy goals pertains to universal primary and secondary education for urban and rural learners. Although the goal does not specifically mention anything regarding expanding technology in education, the integration of ICT into learning across the world calls for equality in learning for all students and improved access to education for all. Not only will ICT improve learning outcomes, the integration of ICT can also offer support to learners from disadvantaged backgrounds and bridge the digital divide between learners in urban and rural areas (Naidoo, 2003).

Implementation of ICT Policy

One major aspect researchers seem to agree on is that digital technologies transform the ways in which people think about teaching and learning (Collins & Halverson, 2009). ICTs can improve education availability and accessibility, thereby helping to reduce educational gaps between urban and rural students, and students with and without disabilities (Dondofema & Shumba, 2018; Khetarpal, 2014). This paper focuses on the implementation of educational reforms in three Southern African countries: Angola, South Africa, and Zimbabwe. These three countries have developed policies and strategies to increase the integration of technology in schools. The following section presents a brief history of special education in these countries, the steps taken in developing their policies and strategies, and current efforts in place to ensure that ICTs are being used in teaching and learning.

HISTORICAL CONTEXTS

Angola, South Africa, and Zimbabwe all have frameworks that support the learning of students with disabilities. These countries share some similar characteristics regarding special education practice. For example, research shows that special education across the three countries is still in its infancy, and there is under-establishment of teacher preparation programs to teach special needs students (Chitiyo &Wheeler, 2004).

Zimbabwe

In Zimbabwe, the government established the Department of Special Education at the United College of Education in Bulawayo in 1983, and the University of Zimbabwe started offering a Bachelor of Special Education degree in 1994 (Chitiyo & Wheeler, 2004). In recent years, the Great Zimbabwe University joined in, offering a similar

degree in Special Education. The main objective is to increase the number of teachers trained in special needs education. Research indicates that since 1994, the number of children with disabilities educated in regular schools has significantly increased (Majoko, 2019). The Ministry of Primary and Secondary Education (MoPSE) has a School Psychological Services and Special Needs Education (SPS & SNE) Department that helps with children's disabilities diagnosis and places students in schools in consultation with teachers, parents, and other stakeholders (Majoko, 2019). The Zimbabwean government mandates the inclusion of children with disabilities in regular schools. However, until now, there is still a large gap in special education provision in Zimbabwe.

Zimbabwe started to implement a number of initiatives to promote the use of ICT in education in the late 1990s. Like the trends in Europe where schools took advantage of the advent of computers for learning, private schools in Zimbabwe acquired computers and introduced computer courses for students. Since then, students started taking the Cambridge examinations in Computer Science. The government later expanded promotion of ICT use in education by developing a computer science exam and engaging in many projects across the country. Among the notable projects by the Zimbabwean government was the school's computerization Programme launched in 2000, Zimbabwe's Education Sector Strategic Plan of 2016-20, the Presidential e-Learning Programme of 2011, and the Electronic Ministry Application Platform introduced in 2016 (Dondofema & Shumba, 2018; Nhema & Zinyama, 2016). Some of these projects were partnerships between the government and other stakeholders like the non-governmental organizations.

The government of Zimbabwe produced its first national ICT policy in 2005, which highlighted the need to promote ICT in education (Rajah, 2015). The policy was informed by a number of general sector policies, such as the Nziramasanga Commission Report of 1999 and the national science and technology policy of 2002 (Musarurwa, 2011). A revised version of the ICT policy only passed into law in 2016. The revised policy was a key enabler for development in all sectors of the economy. Part of the policy noted that there was a 45% penetration of internet in the country by 2015, which is an indication of growth (Government of Zimbabwe, 2015). In 2016 the government also produced the Education Sector Strategic Plan that reiterated the government's desire to provide access to high quality and relevant education to all children (Nhema & Zinyama, 2016). The strategic plan highlighted the need for the creation of a new curriculum that integrated ICT and with labs built in schools to host the ICT equipment. Like in Europe, ICT was initially offered as a subject to students before efforts were redirected to make it part of the teaching pedagogy (Ottestd & Guðmundsdóttir, 2018). Between 2016 and 2019, the Zimbabwean government also got support from the UNESCO-Korean Funds-in-Trust (KFIT), which supported the development of e-schooling, and ICT policy development (Rudhumbu, 2021).

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To promote the efficient use of ICT in education, the Ministry of Primary and Secondary Education of Zimbabwe developed a comprehensive ICT policy for primary education (2019-2023) (Dzinotyiweyi & Taddese, 2020). This is viewed as an avenue to enable learners to achieve their full potential and become productive and responsible citizens. The Ministry of Primary and Secondary Education (MoPSE) website yielded little information on the contents of the policy. In 2018, MoPSE signed a memorandum of understanding with Microsoft that sought to assist efforts to modernize classrooms with technology. In March 2021, the government approved the National e-Learning Strategy for schools, a smart education program that would complement traditional learning forms, increase internet connection, and train teachers on the use of Information Communication (Chronicle, 2021). However, as Nyarufuka (2018) notes, there was no clear road map dedicated to the implementation of ICTs. The absence of the plan seems to suggest that the government and the ministry believe that once adequate hardware and software are available, integration would be successful. A search into the literature and the government website does not provide a clear pathway on how ICT in education will be implemented.

Angola

Angola was embattled in a three-decade civil war that stretched from 1975 to 2002 after the Portuguese colonization. The war destroyed the education system and infrastructure in the country (Bondo, 2015). Angola was the last to gain independence among the three countries. Traditionally, disability was viewed as a curse in the family, and

the country did not have policies that supported students with special needs. The 1975 civil war resulted in several people getting injured and developed different types of disabilities (Antonio et al., 2021). As a result of the disastrous human and material damage, there was a severe lack of teachers and schools to guarantee educational inclusion. The post-war periods characterized the subsequent inclusion-oriented special education policies (Mendes & González, 2021). A National Institute for Special Education (INEE) was established to promote the building of Special Education Schools whose goal was to educate the population with disabilities (Antonio et al., 2021). In terms of education policies, the INEE was linked and dependent on the Ministry of Education and had a legal responsibility to support all administrative roles. Over the years, the department has evolved with the current primary focus on children with visual and hearing impairments (INEE, 2006).

In 2002 the Angolan government created the National Commission for Information Technology (Isaacs, 2007). Despite the absence of an ICT policy then, a number of organizations provided support for the use of technology in schools and for learners. Examples include the Schlumberger Excellence in Education Development (SEED), which supported the building of computer rooms and providing network connections at two schools in the country (Isaacs, 2007). According to Isaacs, initiatives related to ICTs in education were implemented through the AngoNet, Discovery Channel Global Education Fund, Quality Primary Education Project, Education Managememtn Information System (EMIS), SchoolNet Angola, and Catholic University in Angola. Most of these projects sought to provide computer centers that allowed teachers and students access to technologies and resources that helped increase engagement.

In 2002, the country created the National Commission for Information Technology which was tasked with the development of a plan on ICT implementation for the country. The commission's initial task was to develop a plan on how technology would be integrated into the country to promote economic growth. A Strategy for the Development of Information Technology 2000–2010 was produced by the commission. The government produced an ICT development white paper, which aimed to stimulate the development of a knowledge society in Angola (Isaacs, 2007). In 2013, the Government of Angola created the National Plan of Informational Society (PNSI), which oversaw the implementation of the Action Plan of Informational Society 2005-2010. The Action Plan had education as one of its strategic pillars with the following lines of action: a) To reinforce ICT's competencies; b) To reinforce ICT's use in the Teaching and Educational System; c) To increase the access to education and contents; d) To promote research and development (PNSI 2013, p. 3).

The government updated its national policy—the National Development Plan (PDN) 2018-2022—which among its priority actions focused on the promotion of remote education and e-learning. A new System of Basis of Education and Teaching Law proposed future educational modalities where the teaching and learning process happens with ICT resources (Barbante, 2021). A number of projects were implemented by the government and partnerships were established. One example of the projects by the government was Escola Meu Kamba, created in 2014, which is being implemented in partnership with a private company run under the National Development Plan 2013-2017 (Barbante, 2021). This project was also renewed under the current National Development Plan. The Escola Meu Kamba pursues the integration of informatic equipment in public schools and the Primary Education Subsystems. They noted that governments would need to partner with private sectors to increase the integration of ICT in education.

Private initiatives have also been implemented in the country in support of bringing equality in education through the use of technology. The Escola ProFuturo project was launched in the country to capacitate teachers on using technology in their teaching and enable students to acquire abilities and competencies for their personal and professional future (Barbante, 2021). Furthermore, the Escola ProFuturo seeks to reduce the gap in educational quality between boys and girls. Not only does the country suffer from a digital divide between the urban and rural communities, but also a divide by gender (Bondo, 2015). Besides the private initiatives, the government partnered with Huawei Technologies Co. Ltd, where the company will provide support in training teachers to use ICT, supply, install, and maintain computer equipment in schools (Barbante, 2020).

South Africa

Special education for South Africa dates back further compared to that of its counterparts. A Vocational Education and Special Education Act was passed into law in 1928 (Vergottini & Weyers, 2020). Prior to 1900 children with special needs were excluded from formal education. After the establishment of the Act, special schools were built to cater to the needs of these students. However, these schools accommodated children classified as White (Department of Education, 2001). At the end of the Apartheid rule, there were few teachers qualified to teach students with special needs as education became inclusive to all (i.e., people of all races). The growth of regular school education was rapid but that

of special education was confined to the margins of educational concern (Department of Education, 2001). As a result of the discrepancy in the development of regular school education and special education, a white paper–White paper 6– was written addressing these challenges (Government of South Africa, 2001). The findings of the white paper resulted in the development of district-based support teams to introduce strategies and interventions that assisted educators in the regular school system to cope with a diversity of learning and teaching needs. Each district in the country established at least one full-service school to serve as a resource center for ordinary and full-service schools (Department of Education, 2001). It can be noted, just like Zimbabwe, the country encourages inclusive education, with only students with severe special needs attending exclusive special education schools.

South Africa is rapidly implementing ICTs as part of its economy and education and is seen as an outlier within the SADC (Southern African Development Community) region. In 1994 South Africa became an inclusive and democratic political system ending years of apartheid (Blignaut et al., 2010). The country established the National Department of Education, which combined nine newly created Provincial Departments of Education (PDE) and incorporated the Bantustans (see Chisholm, 2018) into the education departments. Since the end of apartheid rule, the government has developed a number of legislations that govern and mandate the delivery of education. Three overlapping principles regulate access to education in the country:Education needs to be accessible to everyone without discrimination; accessibility of education to all; and affordability (Blignaut et al., 2010). In 1995, an E-education White Paper was written that paved the way for developing the Technology Enhanced Learning Initiative (TELI; Jopp, 2020). The TELI was a culmination of research that identified projects that would be used to promote the effective use of technologies in South African education and training (Ntombenhle, n.d). In 2001, the president established the Presidential National Commission in Information Society and Development (PNC on ISAD), whose main goal was to act as an advisory group to the government on challenges regarding ICT development in South Africa and how best to address these challenges (Lesame, 2013). In the following year, the act was established to spearhead all ICT initiatives and develop a five-year national e-strategy.

A paper entitled, "Transforming Learning and Teaching through Information and Communication Technologies" (ICTs) was produced in 2004 and acted as the official governing policy on e-Education in the country (Isaacs, 2007). The policy supported reforms in pedagogical, curricular, and assessments to facilitate improvements in the use of educational resources such as ICT. The policy's goal was to have every learner in the Primary and Secondary school sectors ICT capable by 2013. To ensure the goal was achievable, the ICT policy promoted the establishment of supportive environments in which educational decision-makers were able to make effective decisions that allow technologies to be introduced into teaching and learning. In 2013, a new e-Education Strategy was unveiled which served as the plan for the implementation of e-Education in the country. The implementation of the plan was guided and informed by the 2004 paper. In support of the government's drive to promote ICT in teaching and learning, local companies such as MTN SA Foundation partnered with Mindset Network to roll out an innovative broadcast learning to 29 secondary schools. The program included training and support for Mathematics, Science Technology, and Language Literacy educators (MTN Foundation, 2020).

In 2015, the South African government piloted the digital classroom in seven schools (Ntombenhle, n.d). The schools received internet connections, and each student was given a tablet to use for their education. A total of 17 billion Rands was set aside by the government to roll out the project throughout the nine provinces in the country. The implementation of the project is spearheaded by the country's Provisional Departments of Education (PDE). According to McNulty the Western Cape Education Department (WCED) and Gauteng Department of Education (GDE), are moving forward with ambitious digital education plans. The project in WCED saw the installation of 5,300 smart classrooms (i.e., classrooms equipped with a variety of teaching and learning methods that use technology) in 2021 with a target of 7,300. The GDE has distributed 64,000 tablets to learners, refurbished classrooms, and trained 6,000 teachers in using ICT in the classroom. It would be noted that the South African government creates the national education policy with the Provincial Departments of Education tasked with the implementation of these policies, frameworks, guidelines as they relate to education.

Challenges with ICT policies Implementation

Research on the challenges of the implementation of ICT policies differs amongst countries. The success of ICT implementation is an intertwining of different variables working together. Among the common factors that pose challenges to ICT implementation include infrastructure, policy deployment, and maintenance. Infrastructure combines broadband connections, radio and television transmission, smart classrooms, internet access points, computer

labs, to mention a few. On the other hand, policy deployment will include implementation methods, curriculum development, government and private partnerships, and financing. Once the policy has been put into action, there are measures that need to be taken to maintain the infrastructure and continued implementation of ICT integration. The maintenance will include financing the equipment, repairs, professional development for the educators, and research and development of new technologies being introduced into the market. Each of these three stages can be associated with their own challenges and can hinder the successful integration of ICT into education, as would be intended by the policy.

Most developing countries, including Angola and Zimbabwe, have limited access to resources that allow for the integration of ICTs. Indications show that most rural schools in Africa do not have access to electricity which is a key component to power most technologies. Zimbabwe's electricity access is a mere 40%, with only 16% of the rural population having electricity access. What makes the situation worse is that 67% of the population is based in rural areas. Like Zimbabwe, Angola's electricity access is only 46%, leaving most of the country without power (World Bank, 2021). Besides electricity challenges, most rural areas have poor radio and television transmission, making it difficult to implement Radio-assisted instruction (RAI) and Television-assisted instruction (TAI). There is an unequal distribution and access to ICT infrastructure for teachers and learners in rural and urban areas (Dondofema & Shumba, 2018). For teachers in urban areas, where electricity is available, the lack of computers and adequate material is reported as a hinder to successful ICT integration (Emprica, 2006; Zindi & Ruparanganda, 2011).

In most developing countries, it is difficult to implement technology in education because of the substantial funding required from the government (Mndebele, 2013). Governments such as Zimbabwe have been limited with budgetary constraints to support the implementation of ICT in all schools across the country (Mndebele, 2013). There is a greater need for governments to set up partnerships with the private sector. These partnerships call for a clear framework of implementation. As noted earlier, there is a need for the removal of politicking government activities that deters any meaningful supports. Where partnerships are successfully developed, the challenge comes when the funding ends and the schools take over (Ottestad & Gudmundsdottir, 2018). Parents have the potential for resistance when the cost of maintaining the equipment and internet connection is passed to them. Internet subscriptions are expensive in Angola and Zimbabwe, and it would be difficult for schools to pass the cost to the parents. For South Africa, the cost of internet subscriptions is far cheaper than all the other countries in the region. Although the Zimbabwean government has tried to avert this challenge by developing an internet for schools, the connection has been reported to be slow and unreliable (Nyarufuka, 2018). It would be integral for internet providers and coverage which reduces the subscription costs to be in place for successful adoption of internet by schools. The cost and access to internet will have the potential to bring together students with and without disabilities together, and its lack can also leave people behind (Medina-García et al., 2021).

The successful implementation of ICT in the curriculum requires the development of positive teachers' perception of ICTs being implemented as part of their teaching (Woodrow, 1992). Teachers' attitudes combined with the inherent resistance to change have been noted as significant challenges when trying to integrate technologies in education (Becta, 2004; Cox et al., 1999; Schoepp, 2005). Research indicates that one of the challenges with ICT integration into the classroom is a lack of confidence and appreciation of educational technologies by teachers. This challenge is not unique to any country, including our three countries of focus, but affects both developed and developing countries.

The implementation of a new curriculum into the educational setting will call for changes in perception from both the teachers and learners. Students and teachers will need to have easy access to ICT facilities and be presented with reasons why such technologies would be important to them. Training of teachers would need to be geared towards pedagogical implementation rather than technical issues as this is one of the reasons teachers fear integrating technology in their classrooms (Hattangdi & Ghosh, 2008). It is important that the government remember that the end-users and implementors of the educational policy are the educators and the learners. According to Khetarpal (2014), the success of ICT development in this regard, we must keep in mind that it takes commitment and sacrifice to make ICT accessible to persons with disabilities. According to Hattangdi and Ghosh (2008), the success of ICT development depends on many issues, including training, but training should be directed towards pedagogical rather than technical issues. Furthermore, the teachers will need to be supported and guided in implementing these technologies such that they support inclusive education (Becta, 2004; Pelgrum, 2001; Schoepps, 2005).

Discussion

Countries are transforming their education systems to incorporate information technologies, thus affording their

citizens with knowledge of ICT use and supporting inclusive education. To ensure this transformation is attainable, governments are developing educational ICT policies which are reviewed constantly. Most of these educational policies are designed off the national ICT policy, such that the students, as future employees, are prepared to assimilate into the technological business world. In Angola, the government created the National Plan of Informational Society, which established "Education" as one of the pillars of the development of informational society (Barbante, 2021). The Zimbabwe government established a national ICT policy in 2005, which referred to the promotion of ICTs inclusion in education (Isaac, 2007). The country only established its first education ICT policy for primary and secondary education in 2019 with the policy covering the period 2019 to 2023. The integration of ICT in South African education began before the end of apartheid. However, there was no equality of technology access for all learners. Upon gaining independence from apartheid rule, the government began developing education initiatives with technology, a first in Africa, in pursuit of economic development (Vandeyar, 2013). Further, the e-Education policy developed in 2004 solidified the transformation of learning and teaching with ICT included in education.

A challenge with ICT implementation in the countries of focus has been the digital divide between rural and urban schools. Most schools in rural areas do not have easy access to ICT equipment, internet connection infrastructure, electricity, and financial support to maintain computer labs (Botha et al., 2017; van Stam, 2014). Efforts are currently being taken to try to reduce this divide, as noted from the rural computerization programs in Zimbabwe (Masau, 2018) and the distribution of computer tablets to students in rural South African schools (Mwapwele et al., 2019). Teachers in rural schools cite the availability of technology as a significant challenge for integrating ICT into teaching (Botha et al., 2017). Furthermore, others highlight the lack of a support structure to help them set up the equipment (Musau, 2018).

Angola, South Africa, and Zimbabwe are transforming their teacher preparation programs to train teachers to implement technology in their classrooms (Musarurwa, 2011). Teachers are provided with training platforms such as the Meu Kamba project's computer (Barbante, 2021), ICT Essentials Course for Teachers - Zimbabwe (MoPSE, 2021), and the ICT Skills for Teachers Course-South Africa (SchoolNet, n.d). These courses and projects have been developed to provide teachers with the essential knowledge required to integrate ICT into their teaching. Furthermore, efforts are underway in all three countries to integrate technology into teacher preparation programs. Some colleges in South Africa are providing courses to in-service teachers to bring them up to speed with technology integration in their profession. Though results show teachers feel ill-prepared to integrate technology in their profession, steps to support policies in ICT integration into education are being taken.

The inclusion of technology in education marked transformations in the educational curriculum provided in these three countries. Barbante (2021) indicates that the inclusion of technology in education called for new ways of teaching, new ways of learning, and administrative processes. The administrative change will play a key role in how technology will be incorporated and used in schools. Most schools in the three countries have policies that do not allow students to bring their personal digital devices to school (Mwapwele et al., 2019; Zvavahera & Chigora, 2018). School administrators see mobile phones and other digital devices as disruptive rather than useful to the students learning. As a result of such policies by school districts, they run counter to the government's goals of ICT integration.

Recommendations

The use of ICTs is key in facilitating economic growth and reducing the equality of opportunities between people with and without disabilities in many nations. Countries across the globe are calling for a transformation in the education system that will allow all learners to acquire 21st-century skills. Among the commonly noted skills is the ability "to seek new information, think critically and show creativity and problem-solving competencies to meet the challenges of the fast-changing world" (Ra et al., 2016, p. 80).

This paper assessed educational ICT strategies, their implementation, and enhancers in three Southern African countries: Angola, South Africa, and Zimbabwe. We believe that the successful integration of ICT requires rethinking of planning and implementation strategies from all the stakeholders involved. The development of national commissions and policies alone will not improve the integration of technologies into education unless fundamental issues in their implementation are addressed. The development, implementation, and maintenance of ICTs is a holistic process that needs the input of all stakeholders involved. Ra and colleagues (2016) provided important recommendations for the successful implementation of an ICT policy in education. Zimbabwe, South Africa, and Angola can consider using these recommendation in order to ensure that ICT is successfully integrated into education.

1. National ICT in education vision: There is a need for a national shared vision on why and how ICTs will be

used to transform the country.

2. **National ICT in education plan and policies:** Government consults with the stakeholders, plans, and finances resource allocation for the process.
3. **Complementary national ICT and education policies:** This process involves the development of the policies (national and education). The policies are to be complementary and not standalone. Based on the country's long-term vision, the policy should be able to support the realization of this vision.
4. **Access to ICT infrastructure and resources:** There is a need for a national plan for access to ICT infrastructure and resources as they are a key prerequisite for ICT to transform education. This can be done through the provision of ICT equipment, human resources to maintain the infrastructure, and financing resources to support the initial and maintenance of the infrastructure.
5. **Professional development for teachers and education leaders:** Professional development programmes would need to be designed for preparing teachers and education leaders who will implement the technologies into the learning environments. The programmes would need to be continual to help educators examine and transform their practices based on evolving technologies.
6. **Partnerships:** Public-private partnerships are key to aiding the success of the education sector including the implementation of ICTs. There is a need for the development of smart partnerships to enhance the impact of using ICTs in education.
7. **ICT in the national curriculum:** Development of a national curriculum with the potential to incorporate ICTs and enhance the learning environments. Information Communication and Technology would not need to be taken as a subject or support to an existing curriculum but as a pedagogical agent in curriculum development.
8. **Evaluation and Research:** There is a need for continuous research and evaluation of lessons learned from the current implementations to inform future policy amends.

Based on our assessment of three countries, we provide our recommendations for other countries still seeking to implement an ICT policy:

1. *A Holistic approach to infrastructure and resource planning:* Poor infrastructure hinders efficient distribution or access to ICTs. Countries in Africa continue to lag behind in access to electricity, internet, and radio and television transmission especially between rural and urban populations. To ensure success in the integration of ICT, initial investment in infrastructure (consider internet connection through star link) and electricity across the country should be prioritized. The governments need to promote more internet providers (also can be done with partnerships with other countries) to reduce the broadband internet cost. Ra and colleagues (2016) recommend the development of ICT centers with electricity and internet points for rural communities to access.
2. *The Development of ICT framework:* There is a need for a clearly defined vision for the implementation and maintenance of the ICT infrastructures. The development of an ICT policy will not entail its correct implementation by educators. There is a need for a clear plan on how the policy will be implemented in schools and a clear explanation on how its integration will enhance quality and improve equity and efficiency in education (Hew & Brush, 2007). Without a clear framework and explanation of the integration, the implementors would not know the correct ways to do things.
3. *Educator training and professional development:* Research indicates that some teachers did not receive training in the use of ICT during their teacher training. As a new curriculum that promotes the integration of ICTs, educators need to be trained and receive continual professional development. The training programs should be developed around the needs of the teachers and their level of knowledge with ICT use. Also, teacher preparation providers need to adjust their programs to provide opportunities for their training teachers to appreciate the integration of ICT in their classes (Ostrowick, 2018).
4. *Public-private partnership:* There is a need for continued partnership between the public and private sectors in increasing IT integration in education. These partnerships need to be guided by some framework and clearly defined targets. Governments need to develop clear road maps on how projects are to be implemented and how the private and public partnerships will work.
5. *Establishment of refurbishment centers:* Although the cost of technology equipment is going down, most rural schools cannot afford to buy this new equipment. The cost of buying technology is factored into the students' fee structure, as such, high technology cost on the fees may deter parents. The establishment of computer (and its accessories) refurbishment centers will allow disadvantaged schools to buy equipment at affordable prices.
6. *Budget allocation for ICT maintenance:* The Government will need to set up finances to maintain, research, and improve the current policy in place. Through research, the government should be able to develop adopt respectful integration methods that suit their population. Poor infrastructure

maintenance will result in the government continuously allocating resources to the development process with little progress happening.

Taken together, the authors' recommendations and those provided by Ra and colleagues (2016), one of the key things is for a shared vision when implementing an ICT policy. The development of infrastructure across the country needs to be agreed upon by all stakeholders. As countries have legal frameworks on issues related to people with disabilities, this framework will need to be included when addressing issues of ICT integration into education. The recommendations provided by Ra and colleagues (2016) form the basic components any educational ICT policy need to go through. Added to these recommendations are components most developed countries (i.e., share the same climate with our three countries) would need to consider.

The above recommendations are based on our review of three countries, noting what has been done right and what still needs to be done. Findings from this review show that South Africa has made several achievements in the implementation of its educational ICT policy and seems to be ahead of most Sub-Saharan regions. We believe this comparison and lessons learnt from our three countries can help to inform future educational ICT policy development and reviews. Most countries run parallel policies to include students with special needs in education. Noted in the discussion is that schools are mandated to include students with special needs in their systems. The educational policies developed by governments need to address how integrated technologies will provide equal opportunities for all students. Policies will not need to be developed on the pretext that education in schools is developed to cater for all students needs. The integration of technology has become an important part of the educational systems, as such it will continue to be part of the changes in education. Future research will focus on how developing countries can develop home grown solutions related to technology integration to reduce costs and educational disparities that currently exist.

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