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Reuben Dlamini

University of the Witwatersrand, Reuben.Dlamini@wits.ac.za

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Towards a Critical Perspective on Digitalisation and Initial Teacher Education: Moving Beyond the Brick and Mortar

Reuben Dlamini

University of the Witwatersrand
Wits School of Education
Reuben.Dlamini@wits.ac.za

ABSTRACT

As the pandemic spread, it placed immense pressure on the transformation of the education sector and pushed the sector to fast-track their digital education strategy, especially sharing resources and embracing ubiquitous learning. This necessitated digital transformation, inclusive pedagogies, and reliable connectivity. However, the education sector finds the transition from the legacy traditional face-to-face approach to digital education daunting. The ongoing digital skills dearth among teachers threatens the e-education and equitable educational provisioning agenda of the South African National Development Plan 2030ⁱ. In turn, this has a huge impact on learners in the public-school system, who must develop their digital skills and competencies to effectively participate in the global economy, technology sector, and social entrepreneurial activities. The intersection of digital skills and entrepreneurship have been the engine for creating new jobs, advancing innovation and enhancing productivity. These three constructs, the creation of new jobs, advancing innovation, and enhancing productivity, are the imperatives of the National Development Plan 2030. While the primary focus is on digital transformation as an education imperative, this paper used Bernstein's pedagogic device lens to examine the larger context and framing of digitalisation in education and cultural capital to discern ways in which competencies (the ecosystem of knowledge and skills) may be developed within the existing culture in the public-school system. Digitalisation in education entails a shift from the traditional face-to-face and often 'brick and mortar' based approach to a hybrid approach to enhance access and learners' experience. Furthermore, this study answered questions about the relationship of the technology to teaching and learning. This is driven by increasingly digitally savvy learners, their complex needs, and the demand for ubiquitous access to education. In reviewing the concept of digitalisation, the author noted that there is a need for a digital transformation framework guided by research-informed best practices on the intersection of digitalisation and

initial teacher education. In addition, digital technologies play a huge role in inclusivity and epistemic access and has far-reaching effects on social and economic inequalities.

Keywords: Digital Transformation; Digitisation; Education; Initial Teacher Education

INTRODUCTION AND BACKGROUND

Education is fundamental to individual intellectual growth, personal development, and satisfaction. The critical perspective on digitalisation and initial teacher education (ITE) provides new insights into the intersection of technology and education and a timely and critical perspective to current scholarship on digital education. I sought to displace the mechanistic conception of digital education, which reduces digital education to merely the process of teaching and learning about digital technology. In this paper, ‘digital education’ refers to the intersection of education and technology to create technology-enhanced teaching and learning environments (Mhlongo & Dlamini, 2022). In 2020, all phases of South Africa’s education system faced the fundamentally new challenge of shifting teaching and learning to remote format. This transition was known as emergency remote teaching (ERT: Hodges et al. 2020) and involved the use of digital technologies and online platforms to deliver education.

The Scenario in South Africa: The emergency remote teaching meant conducting live classroom sessions over the internet. Basically, virtual classrooms became the new context for instructional activities and a basket of digital technologies such as learning management systems, videos, podcasts, chat rooms and virtual conferencing platforms were central to the new context. Therefore, online synchronous teaching became part of the revolution, yet in South Africa access to digital devices, digital skills, relevant trainings, and data bundles remained problematic. Both educators and learners were feeling insecure, despite the alignment of digital scaffolding with the principles of blended learning. In a blended learning environment educators and technologies cooperate across digital platforms and in-person spaces. Online synchronous teaching involved educators being acquainted with various software and becoming creative to ensure that no learners are left behind. Due to the complexity and multi-layered problem of implementing ERT, that meant educators needed to have digital skills to ensure inclusivity, digital interactions and digital scaffolding. Given the complexity of revolutionising teaching and learning, this resulted in myself going through pedagogical reflections and practices to ensure full participation and engagement of all learners in the digital space. Then it became clear that teaching and learning needed to be enhanced through the pedagogical integration of various digital tools, such as WhatsApp, Big Blue Button, Podcasts, Videos, and Emails to ensure continuous engagement beyond physical spaces. As part of a reflection exercise, it became clear that the education sector needed to embrace interdisciplinary collaboration and multimedia tools to develop a variety of rigorous processes for learning design and apply relevant instructional design principles. Then I began to explore a variety of digital tools to facilitate collaboration and interactivity in the digital space.

Central to the transition was the intersection of education and technology through digital learning platforms (Dlamini & Ndzinisa, 2020). According to Van Dijck et al. (2018), digital platforms are “hailed as the driver of economic progress and technological innovation” (p. 1) and enable a “participatory culture” (p. 2). However, with the scenario above, there was a mismatch between the teaching profession and the in-service teachers. Considering the importance of digital skills and digital readiness, the transition was bound to leave a majority of learners in public schools behind. Therefore, to achieve convergence with the offline legacy culture of instructional activities, meant that there must be pedagogically and technologically sound methods.

DeLone and McLean’s (2003) six distinct dimensions of information systems success provided an integrated view on technology-orientated education and support of teachers to improve their professional practice. Importantly, in the transition to ERT, the positioning of the connective affordances of digital learning platforms did not automatically translate into education values. The transition was almost impossible in the public-school system due to limited digital infrastructure, limited technological knowledge and the reluctance of teachers to abandon their existing pedagogical methods. Instead of naturalising digital technologies in education, the current paper examined, framed and theorised the entanglements of digital technologies in ITE. ITE is teacher training programmes offered by universities to equip students for school-based teaching (Deacon, 2016). While remarkable progress has been made in ITE in terms of access, the issues of quality education and inequalities in teacher knowledge as the foundation for other types of knowledge, especially pedagogical and technological knowledge, remain unresolved (Brown, 2017; Taylor, 2019). Therefore, the ongoing technological knowledge dearth among teachers threatens the e-education and equitable educational provisioning agenda of the South African National Development Plan 2030. According to the National Development Plan 2030, “a strong educational system spanning early childhood development, primary, secondary, tertiary and further education is crucial for addressing poverty and inequality” (National Planning Commission, 2013, p. 263). South Africa is looking at the intersection of its diverse workforce and digital technologies to enhance the capacity of the state on e-skills. The South African e-Skills Council defines e-skills according to the following three levels (Merkofer & Murphy, 2009):

Level 1 (e-literacy)—e-skills that are needed for modern life outside the workplace and often defined as e-literacy or digital literacy; Level 2 (e-skills)—e-skills that are used as a tool in the workplace but are not part of the job; and Level 3 (ICT specialist)—ICT specialists who have technical skills needed both in the ICT industry and related jobs in ICT enabled industries.

Without digital literacy, the education sector finds the transition from the legacy traditional face-to-face approach to digital education daunting. This can be attributed to the extreme inequitable distribution of technological knowledge and digital resources across the country. The responsibility for building technological knowledge rests primarily with ITE programmes. The National Policy on Teacher Education in South Africa (DHET, 2015) specifies that student teachers must have the aptitude to use information and communication technologies (ICTs) competently before graduating and “understand the complexities of teaching” (Robinson & Rusznyak, 2020, p. 519). The policy demands that all teachers must be ICT competent, which is “the ability to use information and communication technologies (ICTs) competently” (DHET, 2015, p. 15). The intersection of ICT competency and the development of “specialised pedagogical content knowledge” (DHET, 2015, p. 10) enable teachers to present content knowledge in multiple ways to create appropriate learning opportunities for diverse learners.

In the South African context, the following question is critical: What is the state of e-readiness to exploit the pedagogical affordances of ICT in education? In South Africa, the transition to digitalisation coincided with the Fourth Industrial Revolution (4IR) hype. The 4IR is driving the “digital revolution, which combines the physical, digital and biological domains to develop systems to serve humans and to protect the environment” (Ally & Wark, 2020, p. 3). Interestingly, the game-changing features of the 4IR provide education with the opportunity to rethink instructional strategies and the provisioning of education in the wider society. According to Schwab (2019), the 4IR “is not merely a series of incremental technological advancements, it is an upheaval—a dramatic and wide-ranging shift in the way that value is created, exchanged, and distributed across individuals, organizations, and entire economies” (p. 13). Hence, in the education sector, ICT tools should not be viewed as educational add-ons but embraced as enabling pedagogical tools to support inclusive and innovative ways of teaching and learning. The role of technological knowledge in the intersection of education and technology is massive, especially in the adoption of digital pedagogies to enhance teaching and learning. However, educators must have the required knowledge, skills and support necessary to integrate digital tools and enable digital scaffolding in a socially networked environment, and the integration of digital tools must be presented within a framework for teacher development. Hence, the current paper attempted to answer the following question: *How can education practitioners harness digital-driven innovation to revitalise the education sector and drive inclusivity and epistemic access?*

There are many studies with multiple theoretical models on the pedagogical integration of ICT in education (Dlamini & Ndzinisa, 2020; Scheffer, 2021), but the contributions are fragmented. Therefore, this study contributes to the present discourse on digitalisation in education considering that the Covid-19 pandemic fast-tracked the integration of digital technologies and learning platforms. Furthermore, there are cases to provide evidence of digital transformation and its role in improving teaching and enhancing learners' experience. The drivers and enablers of digitalisation are digital resources and skills to establish best practices for the pedagogical integration of ICT into teaching and learning. Digitalisation in education entails a shift from the traditional face-to-face and often 'brick and mortar' based approach to a hybrid approach to enhance access and learners' experience.

TOWARDS DIGITALLY ENABLED INITIAL TEACHER EDUCATION

ITE is an essential part of the education system as it produces educators in accordance with government policies. In South Africa, ITE is governed by the National Qualifications Framework Act (Act No. 67 of 2008) and set out in MRTEQ, which is the policy on the Minimum Requirements for Teacher Education Qualifications (DHET, 2015). ITE is highly complex with multi-layered segments (Robinson & Rusznyak, 2020), yet it is central to the development of skills required by future employees in various industries (Maisiri et al., 2019). This multi-layered segment comprises various knowledges and capitals to be acquired. The movement of ideas and information across the highly complex environment and the advancement of technology influence how education is delivered. According to Andreassen et al. (2022), ITE "plays a vital role in preparing pre-service teachers (PSTs) to integrate technology into their classroom practice" (p. 61). In South Africa, pre-service teachers are expected to achieve proficiency in ICT to be digitally savvy teachers to support the development of learners' digital competencies (DHET, 2015). Educators' being digitally relevant is important to the process of making digital skills accessible to all learners.

To cope with these challenges, in 2015, the South African government launched Operation Phakisa Education to unlock the education sector and make it digitally relevant (Kwet, 2017). Therefore, it is a requirement for ITE to change its instructional practices by integrating digital technologies into the core curriculum in order to manage the realities of 21st century (La Fleur & Dlamini, 2022). According to La Fleur and Dlamini (2022), the "recent disruptions caused by the ongoing pandemic and the subsequent push towards a blended model of teaching and learning, require teachers to have the necessary skills to be able to teach in such an

environment” (p. 5). Garrison and Kanuka (2004) defined blended learning as a “blend of text-based asynchronous Internet technology with face-to-face learning” (p. 96). In lieu of the blended learning discourse, “there is an expectation that meaningful investments will be made in the development of digital skills and professional learning communities (PLCs) to improve teachers’ professional practice” (La Fleur & Dlamini, 2022, p. 5). The shift to digitalisation has intensified, and therefore, the education sector must respond to the contemporary global-local education context by ensuring socially responsible educational practices for diverse learners. However, the existing digital gaps and inequalities across societies in South Africa are a weakness in the system, preventing the adoption of new technologies, and a stumbling block to digital transformation.

DIGITAL TRANSFORMATION AS AN EDUCATION IMPERATIVE

In this article, digital transformation is the implementation of the latest digital technologies (social media, devices, analytics) and learning platforms to improve access to education and enhance learners’ experience (Mhlongo & Dlamini, 2022). Vial (2021) defined digital transformation “as a process where digital technologies create disruptions triggering strategic responses from organizations that seek to alter their value creation paths while managing the structural changes and organizational barriers that affect the positive and negative outcomes of this process” (p. 13). Hanelt et al. (2021) claimed that the extensive and diverse literature “suffers from a lacking common agreement on exactly what DT [digital transformation] is” and “what it encompasses”; however, “a common theme in the current debate is that due to the proliferation of digital technologies—defined as the combination and connectivity of innumerable, dispersed information, communication and computing technologies” (p. 1160). Digital transformation in education begins with a learner-centric approach informed by constructivism (La Fleur & Dlamini, 2022).

According to Li and Guo (2015), constructivism “encourages experimental learning, hands-on learning and collaborative learning” (p. 3). Digital transformation as an education imperative would mean integrating sophisticated emerging digital technologies to galvanise education and solve education problems, especially during pandemics such as Covid-19. The emerging technologies in the 4IR period comprises the internet of things, artificial intelligence, robotics, interactive virtual environments, 3D printers, digital learning platforms, etc. All these technologies have the potential to extend the physical world and allow ubiquitous education. This is education that is not bound by physical spaces and time. The Covid-19 pandemic pushed

the education sector to fast-track their digital education strategy and embrace ubiquitous learning. According to Dlamini and Ndzinisa (2020), digital learning platforms became pedagogical tools to enable online teaching and learning. Unfortunately, inequalities were made visible in the education sector, and the public education system was left behind while private schools had unlimited access to digital resources, which enabled them to transition to online teaching and learning with ease.

The major challenge for rural communities and educators and learners from disadvantaged backgrounds was lack of access to digital skills, the internet and digital infrastructure to unlock their participation in online teaching and learning (Mdiniso et al., 2022; Ndzinisa & Dlamini, 2022). There was evidence of unequal access to digital resources and competencies, which widened the access gap to education. As such, a greater need exists to resource public schools and create opportunities for teachers to develop best practices in digital pedagogies and online education. Given the complications in the public-school system, especially the existing culture of inefficiencies, limited resources, and knowledge (content, pedagogical and technological) gaps, it is necessary to frame digitalisation in education. In the long run, an ecosystem of knowledge and skills may be developed within the existing culture in the public-school system. A major problem in the teaching profession is making the connections of how digitalisation enables cognitive development and bridges the access gap to education, especially in an unequal society. Teachers must see digital technologies in their own professional and cultural context. Currently, “teachers’ ICT professional development needs are not addressed in a meaningful and systematic way despite the demand for teachers to develop ICT skills and competencies” (Dlamini & Mbatha, 2018, p. 17). This is despite ICT fundamentally disrupting education and the teaching profession.

THE 4IR IN EDUCATION AND ECONOMIC DEVELOPMENT IN SOUTH AFRICA

In this highly digital era, the education sector is challenged with the presence of digital technologies with well-documented possibilities and education transformation imperatives. The plethora of digital possibilities has had a huge impact on instructional activities and engagement with content knowledge. In South Africa, the National Treasury (2018) pronounced that adopting the 4IR would boost government effectiveness and efficiency in public service delivery. Moloi and Mhlanga (2021) asserted that the “4IR is expected to have far-reaching implications on all the aspects of our daily lives, with an effect on how people interact with technology with massive transformation on how we work, live, and do our work”

(p. 4). However, the South African context is important in the discourse on education and the 4IR and there are “mixed sentiments of unpreparedness, excitement and fear of redundancy due to limited knowledge of 4IR’s place in the classroom and future workplace” (Scheffer, 2021, p. 440). The development of digital skills is important to drive innovations and position digital technologies as core to teaching and learning.

Therefore, the dearth of digital skills (4IR literacy) in ITE is problematic because ITE programmes continue to graduate teachers that lack technological knowledge. This has a huge impact on learners in the public-school system who must develop their digital skills and competencies to effectively participate in the global economy, technology sector, and social entrepreneurial activities. The intersection of digital skills and entrepreneurship has been the engine for creating new jobs, advance innovation, and enhance productivity (Huđek et al., 2019; Van Laar et al., 2017). The new concept of the economy is driven by the advancement of information technology systems and the developments in the 4IR. Hence, it is important to put the appropriate structures and programmes in place to drive digitalisation in education and to drive the socio-economic effects of innovation. The intersection of education and technology should be governed by a framework (innovation ecosystem) that allows new approaches to teaching and learning to emerge.

Unequal access to digital infrastructure and connectivity has serious implications for human capital. In the South African context, digital capital is essential, otherwise schools and high-tech industries will not have access to the right digital competencies. This results in misalignment between skills and the technology revolution, which is a significant driver of the modern economy (Scheffer, 2021; Schwab, 2018). Therefore, it is important to ensure that the education system is implementing technologies as strategic tools to enhance teaching and learning. This points to the importance of mobilising resources because government alone cannot afford the creation of digital-savvy schools. There must be new partnerships between government and the private sector to formulate strategies for digital education and inclusive growth. This will increase the public-school system’s effectiveness and efficiencies and produce the ‘digitally savvy’ workforce needed to build an economy and society.

‘Digitally savvy’ learners as a future workforce will be able to easily acquire advanced digital skills (Huđek et al., 2019; Ivanović-Đukić et al., 2019). Several contemporary empirical research studies confirm that a key driver of economic growth is entrepreneurship and innovations (Garcez et al., 2022; Huđek et al., 2019; Ivanović-Đukić et al., 2019; Zupančič,

2018). According to Ivanović-Đukić et al. (2019), “the application of new technology enables entrepreneurs to offer new digital solutions that can change the world radically” (p. 654). Evidentially, digitalisation accelerates change and institutional culture. According to Garcez et al. (2022, p. 1160), digital transformation was “stimulated, re-organising society in its way of thinking, acting, promoting, consuming and creating new business” during the Covid-19 pandemic. In this context, the disruptive nature of digital transformation brought new paradigms on teaching and learning, and the debates highlight the need to enhance existing education theories in the complex multi-layered segments of ITE. This multi-layered segment comprising various knowledges and capitals to be acquired must adopt a holistic perspective on the role of digital technologies in education.

BERNSTEIN’S THEORY OF THE PEDAGOGIC DEVICE: DIGITALISATION AS PEDAGOGIC DEVICE

To develop deeper insights and understand the intersection of technology and education as a requirement to digital transformation, I adopted Bernstein’s (2000) theory of the pedagogic device as my lens. This paper conceptualised digitalisation as a pedagogic device with educational affordances to enable multiple access to education. Bernstein’s (2000) theory of the pedagogic device is about the structure of knowledge and pedagogic practice to transform power relations and the way in which knowledge is classified and framed (Wheelahan, 2005). According to Wheelahan (2005), “the classification and framing of knowledge are united in pedagogic practice” (p. 1) and impact the identity of the teachers. Therefore, the intersection of technology and education depends on the knowledge structures of the different fields, and the way the knowledge is presented and accessed depends on various capital resources. Bernstein (2000) explained that “recontextualising singulars into larger units which operate both in the intellectual field of disciplines and in the field of external practice. Regions are the interface between disciplines (singulars) and the technologies they make possible” (p. 52).

In the current context in South Africa, the ‘old’ regions represent the traditional face-to-face approach to education, and the ‘new’ regions represent technology-enhanced learning environments. However, the current human capital situation in the teaching profession in South Africa, especially in teachers’ ICT professional development, is disjointed and violates the norm of equality in the professional practice of teachers. Instead of empowering learners to have access to a variety of digital technologies to enable them to access knowledge and

information beyond the classroom, it limits their participation in global knowledge and opportunities of life.

This inequality is morally unjustified as it limits learners' and teachers' freedom of participation in the development of their social and cultural capital. These capitals are necessary resources to access communities of professional practice and have serious implication for social and economic inequalities. Therefore, it is important to examine the impact of digital technologies on social justice, epistemic access, and the implication for social and economic growth. Considering the technological affordances, including ubiquitous and multimodality, this study, without neglecting the social and cultural contexts, explains how digitalisation as a pedagogical device enables inclusivity and multiple entry to education. Perhaps the dichotomy between theory and practice and the interplay between technology and education that lies at the heart of digitalisation in ITE is more important. In this view, affordances offered by these technologies should be part of the current human capital discourse in ITE programmes. Bernstein (2000) explained it as follows:

...the ability to respond to such a future (perpetual 'trainability') depends upon a capacity, not an ability. The capacity to enable the actor to project him/herself meaningfully rather than relevantly, into this future, and recover a coherent past. This capacity is the outcome of a specialised identity and this precedes ability to respond effectively to concurrent and subsequent retraining...It is not a purely psychological construction by a solitary worker as he/she undergoes the transitions which he/she is expected to perform on the basis of trainability. This identity arises out of a particular social order, through relations which the identity enters into with other identities of reciprocal recognition, support, mutual legitimisation and finally through a negotiated collective purpose. (p. 59)

To acquire technological knowledge is developmental, and responsive structures are important because technological knowledge is drawn from complex bodies of knowledge. Therefore, teachers must see the relevancy of knowledge in their professional practice. This makes the principles underpinning digital literacies important, because it allows pedagogical knowledge to be easily integrated. It is important to enable both educators and learners with the necessary digital competencies so that they fully support the efforts being made to transform the education sector.

THE IMPERATIVES OF THE NATIONAL DEVELOPMENT PLAN

The imperatives of the National Development Plan are the creation of new jobs, advancing innovation and enhancing productivity. The National Development Plan formed the basis of the government's attempt to eradicate poverty, reduce unemployment, and eliminate inequalities (socially and economically excluded) while increasing opportunities for all (National Planning Commission, 2013). The Brookings Institution statistics on South Africa social grant recipients in 2020 showed that 61% of the population received social grants. This is indicative of the economic disparities on the ground and the rise of unemployment, especially among the youth. While government is applauded for this effort, structures must be put in place in the education system to unlock skills and enable schools to become feeders to academic opportunities and to become artisan feeders to participate in the local employment opportunities.

While these grants “play a significant role in alleviating hunger, they are insufficient to lift people out of poverty...” (Hendriks, 2013). At this point, it seems useful to develop enabling governance structures and curricula aligned with digitalisation because the technological knowledge and skills gaps endanger the digital economy and the 4IR progress. There are no shortcuts to human development, which is why I advocate for a systematic approach with dynamic structures to teachers' professional development opportunities. These digital technologies driving the 4IR are fundamentally changing the economy, education, human identities, and computer processing power. On the societal front, there are uncertainties surrounding ICTs, which makes it important to have a “comprehensive and globally shared view of how technology is changing our lives and those of future generation, and how it is reshaping the economic, social, cultural and human context in which we live” (Schwab, 2017, p. 2). Thus, the National Development Plan recognises that human capital is essential to alleviate any forms of exclusion so that all citizens can participate in the economy of South Africa.

INITIAL TEACHER EDUCATION AND DIGITALISATION

The negative perception of digitalisation was a major challenge due to lack of “access to computing devices and the associated support and training requirements, as well as students' access to computing devices and data” (Dlamini & Ndzinisa, 2020, p. 59). Hence, it is important to take into account the social and economic realities of teachers and learners in order to effect meaningful and accepted educational change. In addition to teaching and learning, the national policy requires student teachers in ITE programmes to complete supervised school-

based practicum. The transition and adaptation to an online modality was a daunting task and “represented huge resource, technical and pedagogical challenges” (Robinson & Rusznyak, 2020, p. 517). The abrupt shift to online demanded the development of varied digital knowledge and skills to ensure digitalisation is complementary to the current ITE offerings. Anticipating the future is necessary, but now is the time to think deeply about digital technologies in education. In the process of reimagining education in the digitalisation era and enriching the discourse on infusing digital technologies and pedagogies in ITE programmes, I identified the drivers of digital education and online learning. The drivers are,

- Digital scaffolding organising learning activities in real-time to support active learning processes.
- Through a combination of different modalities or delivery media to allow learners continuous access to instructional resources.
- Ubiquitous education to provide alternative pathways to education instead of the traditional face-to-face.
- Flexible learning experiences to more learners, synchronously and asynchronously access.
- Digital collaboration to give learners access to wider communities and networks as they develop cognitively.
- Learners’ needs or requirements to ensure inclusivity and transformative experience.

Reviewing the concept of digitalisation creates an opportunity to develop effective educational practices guided by research-informed best practices on the intersection of digitalisation and ITE. The drivers of digital education and online learning provide a comprehensive picture of priorities the education sector should focus on because those drivers have implications for education access and equity. It is evident that the influence of digital technologies on inclusivity and epistemic access are huge and has far-reaching effects on social and economic inequalities. Digital technologies are central to the future where face-to-face, online and hybrid approaches will complement each other and transform the classroom experience. Given the complexity of ITE, it is imperative to weave digitalisation into the fabric of the curriculum and focus on the teaching and learning ecosystem in hybrid environments to adapt to diverse needs and situations.

CONCLUSION

As we look forward, we must reflect on the current pedagogical approaches to ITE and interrogate how it responded during the Covid-19 pandemic. A critical consideration is the required resources to make any transition to digitalisation smooth, focusing not just on technology but also on supporting structures and strategies for inclusive and transformative pedagogies. The appropriation of digital technologies in teaching and learning can challenge the thinking and engagement with various concepts and methods in the classroom. Teachers must develop their digital competencies to successfully interface with new and emerging technologies. There is agreement in the literature on the educational benefits of digitalisation to enable inclusivity and enhance learners' experience (Dlamini & Mbatha, 2018; Mdiniso et al., 2022; Ndzinisa & Dlamini, 2022). The need for transformative tools in all areas of human activity is huge, and it is necessary to develop innovative ways to address educational imbalances to create equal education opportunities. Hence, the believe in digital technologies to bring transformative change in the education sector.

REFERENCES

- Ally, M., & Wark, N. (2020). Sustainable Development and Education in the Fourth Industrial Revolution (4IR). In 2020 by the Commonwealth of Learning: Burnaby, British Columbia.
- Andreasen, J. K., Tømte, C. E., Bergan, I., & Kovac, V. B. (2022). Professional digital competence in initial teacher education: An examination of differences in two cohorts of pre-service teachers. *Nordic Journal of Digital Literacy*, (1), 61-74.
- Bernstein, B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique* (Vol. 5). Rowman & Littlefield.
- Brown, B. (2017). A systems thinking perspective on change processes in a Teacher Professional Development programme. *Journal of Education*, (66), 37-64.
- Deacon, R. (2016). The initial teacher education research project. Final report. JET Education.
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems*, 19(4), 9-30.
- Department of Higher Education and Training (DHET). 2015. Policy on the Minimum Requirements for Teacher Education Qualifications. Pretoria: Government Gazette.
- Mhlongo, S., & Dlamini, R. (2022). Digital Inequities and Societal Context: Digital Transformation as a Conduit to Achieve Social and Epistemic Justice. In *Innovation Practices for Digital Transformation in the Global South* (pp. 1-15). Springer, Cham.
- Dlamini, R., & Mbatha, K. (2018). The discourse on ICT teacher professional development needs: The case of a South African teachers' union. *International Journal of Education and Development using ICT*, 14(2).
- Dlamini, R., & Ndzinisa, N. (2020). Universities trailing behind: unquestioned epistemological foundations constraining the transition to online instructional delivery and learning. *South African Journal of Higher Education*, 34(6), 52-64.
- Garcez, A., Silva, R., & Franco, M. (2022). Digital transformation shaping structural pillars for academic entrepreneurship: A framework proposal and research agenda. *Education and Information Technologies*, 27(1), 1159-1182.

- Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, 58(5), 1159-1197.
- Hendriks, S. (2013). South Africa's National Development Plan and New Growth Path: reflections on policy contradictions and implications for food security. *Agrekon*, 52(3), 1-17.
- Hodges, C., S. Moore, B. Lockee, T. Trust and A. Bond. 2020. The difference between emergency remote teaching and online learning. *EDUCAUSE Review*.
<https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teachingand-online-learning>.
- Hudek, I., Širec, K., & Tominc, P. (2019). Digital skills in enterprises according to the European digital entrepreneurship sub-indices: Cross-country empirical evidence. *Management: Journal of Contemporary Management Issues*, 24(2), 107-119.
- Ivanović-Đukić, M., Stevanović, T., & Rađenović, T. (2019, January). Does digitalization affect the contribution of entrepreneurship to economic growth. In *Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business* (Vol. 36, No. 2, pp. 653-679).
- Kwet, M. (2017). Operation Phakisa education: Why a secret? Mass surveillance, inequality, and race in South Africa's emerging national e-Education system. *Mass Surveillance, Inequality, and Race in South Africa's Emerging National E-Education System* (December 4, 2017).
- La Fleur, J., & Dlamini, R. (2022). Towards learner-centric pedagogies: Technology-enhanced teaching and learning in the 21st century classroom. *Journal of Education* (University of KwaZulu-Natal), (88), 4-20.
- Li, L., & Guo, R. (2015). A student-centered guest lecturing: A constructivism approach to promote student engagement. *Journal of instructional pedagogies*, 15.
- Maisiri, W., Darwish, H., & Van Dyk, L. (2019). An investigation of industry 4.0 skills requirements. *South African Journal of Industrial Engineering*, 30(3), 90-105.
- Mdiniso, J., Shangase, Z. P., Nkwanyana, S., Cele, S., & Mkhasibe, R. G. (2022). Transition to Emergency Online Learning in SA: Reflection of Historically Black Universities. *African Journal of Development Studies* (formerly *AFFRIKA Journal of Politics, Economics and Society*), 12(1), 209-228.

Merkofer, P., & Murphy, A. (2009). The e-skills landscape in South Africa. *Zeitschrift für Politikberatung*, 2(4), 685-695.

Moloi, T., & Mhlanga, D. (2021). Key Features of the Fourth Industrial Revolution in South Africa's Basic Education System. *Journal of Management Information & Decision Sciences*, 24(5).

National Planning Commission. (2013). National development plan vision 2030. Republic of South Africa, Pretoria.

National Treasury (2018). Budget Review 2018. Republic of South Africa, Pretoria.

Ndzinisa, N., & Dlamini, R. (2022). Responsiveness vs. accessibility: pandemic-driven shift to remote teaching and online learning. *Higher Education Research & Development*, 1-16.

Robinson, M., & Rusznyak, L. (2020). Learning to teach without school-based experience: Conundrums and possibilities in a South African context. *Journal of Education for Teaching*, 46(4), 517-527.

Scheffer, L. (2021). SPOT, the 4IR soft skills strategy for South African interior design graduates: An integrative literature.

Schwab, K. (2017). The fourth industrial revolution. Currency.

Schwab, K. (2018, November). The global competitiveness report 2018. In *World Economic Forum* (Vol. 671).

Schwab, K. (2019). Foreword. *Journal of International Affairs*, 72(1), 13–16.
<https://www.jstor.org/stable/26588338>

Taylor, N. (2019). Inequalities in teacher knowledge in South Africa. In *South African schooling: The enigma of inequality* (pp. 263-282). Springer, Cham.

Van Dijck, J., Poell, T., & De Waal, M. (2018). The platform society: Public values in a connective world. Oxford University Press.

Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in human behavior*, 72, 577-588.

Vial, G. (2021). Understanding digital transformation: A review and a research agenda. *Managing Digital Transformation*, 13-66.

Wheelahan, L. (2005). The pedagogic device: the relevance of Bernstein's analysis for VET.

Zupančič, M. (2018). Employees: Invisible Added Value of a Company. *Naše gospodarstvo/Our economy*, 64(2), 52-61.

ⁱⁱ https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf