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Technology practices to promote equity, access and quality in South African higher education: a multi-case study

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Minor Dissertation

Research Title:

Technology practices to promote equity, access and quality in South African higher education: a multi-case study

Submitted in the partial fulfilment of the requirements of the Master of Education (MEd) by coursework and research at The University of the Witwatersrand

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Declaration

I, **Rodwell Chindomu**, certify that this research report is original, except where citations and acknowledgements indicate otherwise. I also certify that the minor dissertation entitled: **Technology practices to promote equity, access and quality in South African higher education: a multi-case study,** is my own work.

Signature:  **Date: 13 March 2024**

Acknowledgement

I thank the Almighty God, for giving me the strength and resolve to start and complete this study.

To my family, friends and pastors, I say thank you for the moral, spiritual and material support that you rendered.

I am indebted to my supervisor, Dr NS Ndlovu, for patiently assisting me to shape this study into a coherent report.

Dedication

To all the heroes and heroines who fight for epistemic justice.

Abstract

South Africa is still grappling with the legacy of historical inequalities, which ultimately culminate in large portions of the population being excluded, in both subtle and overt ways, from accessing quality higher education. The study explored the role of technology in nurturing equity, access and quality in the South African higher education context. The study sought to address these seemingly relentless incongruences, which students and institutions are currently experiencing. To achieve this aim, the study employed qualitative methods to explore the technological practices that the selected higher education institutions (HEIs) and academics used to enhance the quality of educational outcomes. The theoretical lens that informed this study was blended from Ertmer *et al.*'s (2012) espoused and enacted technology practice theory and Hohfeld's (1919) rights-based theory. Using an in-depth and expansive literature review, analysing of institutional policies and collecting data by means of open-ended questionnaires, the study identified some approaches that HEIs and academics could adopt in leveraging technology to bridge the lingering access, equity and quality gaps in higher education. In so doing, the study made valuable contributions to the emerging debate on how the prevailing equity, access and quality challenges in the South African higher education context could be addressed through technology-driven solutions. Two non-probability sampling techniques were used to select participants from the three case study institutions, four of whom were conveniently sampled. The other four participants, were snowball-sampled with the help of the researcher's two contacts two state HEIs, who also participated in the study, thus, bringing the number of participants to ten. The researcher also analysed institutional policy documents related to technology usage, which were generally found to be in sync with the practices that were described by the participants. The findings of the study showed that all the HEIs actively promoted technology integration, with one of them having already begun to explore the incorporation of artificial intelligence in teaching and learning spaces. The study also found that the use of digital technology enhanced pedagogical practices, but its deployment in HEIs was still hampered by literacy, generational and socio-economic gaps, among others.

Keywords: Technology Practice, Digital Technology, Equity, Access, Quality, Higher Education Institutions

List of acronyms and abbreviations

COVID-19	Corona-virus disease of 2019
DHET	Department of Higher Education and Training
DST	Department of Science and Technology
ERT	Emergency Remote Teaching
HEI	Higher Education Institution
ICTs	Information Communication Technologies
IIE	Independent Institute of Education
IPO	Input-Process-Output
LMS	Learning Management System
NPC	National Planning Commission
NSFAS	National Students Financial Aid Scheme
PHEI	Private Higher Education Institution
UDHR	Universal Declaration of Human Rights

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Chapter 1: Introduction

1.0 Introduction

Equitable access to quality higher education is foundational to overall human development. As the world is rapidly getting interconnected, it is becoming more and more knowledge-driven (Asongu, Tchamyou & Acha-Anyi, 2020). It is, therefore, imperative for higher education institutions, which are agents of socio-economic transformation, to make educational opportunities more widely accessible than ever before. Technology, which has evidently put the nations in the global north high up on the global human development rankings, is one of the tools that can be used to increase educational access and quality.

By African standards, South Africa is regarded as an economic powerhouse and its universities are ranked higher than their continental counterparts, but they still trail behind institutions from the developed world (Times Higher Education, 2024). However, South Africa is arguably one of the most unequal societies, due to a long history of colonial rule and apartheid. The vestiges of the twin evils are still covertly and overtly present in many spheres, including higher education, where access to quality tuition, seems to be a more of a privilege than a sacrosanct right (Cini, 2019). Until recently, the South African higher education context was characterised by limited access to digital resources and this arguably frustrated both students and academics in historically disadvantaged HEIs (Lubinga, Maramura & Masiya, 2023). Although the situation is improving, the lingering digital access and equity gaps cannot be downplayed. There are still significant access gaps to computers and the internet, in addition to incompatible values and low levels of digital literacy among the students and lecturers (ibid). Accordingly, the study sought to investigate how institutions of higher learning and academics can leverage technology as a tool for redressing the aforesaid inequalities.

In order to accomplish the aforesaid goal of the study, the researcher used the qualitative approach, notably analysis of published sources and a multi-case study strategy to investigate the technology practices of three HEIs and ten academics from each of the selected institutions. Apart from using published institutional sources to collect data pertaining to institutional technology usage policies, the research also used open-ended questionnaires. The reason for this was to investigate the

perceptions and experiences of the sampled participants, with regard to how they and their HEIs used technology to bridge the access, equity and quality gaps.

Overall, the study made valuable contributions to the unfolding debate on equity, access and quality challenges in South African higher education. This culminated in the establishment of data-driven recommendations for using technology to address the aforementioned challenges.

1.1 Background of the study

South Africa is a developing country that emerged from hundreds of years of colonialism and close to fifty years of blatant racism and segregation in all spheres of human existence. Consequently, the South African tertiary education sector is still seized with legacy and emerging challenges that make it difficult to ensure universal access to quality higher education. However, the advent digital technology can yield equitable access to quality higher education for students from different socio-economic backgrounds. Understandably, there are many problems that militate against this transformative vision. Such hindrances include lack of digital skills and affordability. For example, academics and students who have computer and digital literacy handicaps generally lack the drive to make use of digital resources. The high cost of rolling out digital infrastructure and purchasing computers, laptops and data further exclude many potential users from the benefits of technology-driven pedagogy. In addition to the aforesaid challenges, South Africa has been experiencing unprecedented load shedding and poor connectivity, thus, compelling the government, institutions and families to spend scarce financial resources on trying to mitigate the problems.

As a result, there is need adopt transformative technology practices in teaching and learning spaces, so as to promote equitable access to quality higher education. Prior to the COVID-19 pandemic, most South African HEIs had learning management systems (LMSs), but only a few harnessed their blended and hybrid teaching and learning potentials. Thus, the majority of academics and students in contact institutions hardly felt compelled to hone their digital skills, particularly in terms of leveraging technology for pedagogical purposes. As argued by Ertmer *et al*. (2012), some academics shun productive technology usage in their practices because they lack confidence in their digital competences. This negatively impacts the quality of

educational outcomes and, ultimately, what Temoso and Myeki (2023), the total factor productivity of HEIs, which is a product of teaching efficiency and technology usage.

Given the level of technological capacitation in most South African HEIs, one may be persuaded to overlook the existence of the digital gap and its impact on the use of educational technology to promote significant or productive learning (Ndlovu & Moll, 2016; Fink, 2003). In other words, many HEIs, academics and students are variously excluded from some facets of educational technology due to lack of smart devices and up-to-date software, as well as low levels of digital efficacy.

As alluded to in the introduction, the main goal of the study was to critique the overarching impact of current technology practices in South African higher education institutions. Ertmer *et al.*'s (2012) espoused and enacted practices theory and Chua's IPO framework framed the assumption of the study namely: judicious technology practices can reduce the digital gap and yield epistemic justice in the form of universal quality education. In the context of this study, the meaning of the term **technology** is limited to a wide range of digital educational technologies and platforms, as identified by Vergara (2021).

1.2 Problem statement

The South African government and higher education institutions are evidently trying to correct the disparities that hinder equitable access to high-quality education. However, these efforts are met by historical and systemic barriers that keep some students and academic marginalised from optimally enjoying the benefits of educational technology. These challenges make it difficult to deploy relevant digital interventions or derive advantages therefrom, thus, compromising the quality of education. Thus, current technology practices and the distribution of related resources in South African higher education are not entirely inclusive.

A significant proportion of academics and students experience challenges related to accessing digital devices and internet connectivity (Purcell, 2022). Some lecturers and students fail to experience the benefits of digital technology due to lack of digital literacy skills. This is supported by Al-Hunaiyyan, Al-Sharhan and AlHajri (2020, p.73) whose study found that both academics and students shunned "the advanced functions and tools" of their institutions' learning management systems (LMS). As a result, such users deprive themselves of the inherent benefits of using platforms like

Blackboard, Moodle, Google Classroom and Schoology. This would be contrary the mantra **no one left behind**, which was adopted during the transition to Emergency Remote Teaching (ERT) during the COVID-19 lockdowns in the 2020 and 2021 academic years (Purcell, 2022). This exposed the disjuncture between espoused and enacted technology practices, thereby putting South African HEIs at the centre of a subtle digital divide. Unfortunately, the gap tends to be regarded as negligible, yet it hinders productive engagement on digital educational platforms (Purcell, 2022; Faloye & Ajayi, 2021; Ndlovu & Moll, 2016).

1.3 Justification of the study

Prior to conducting this study, I observed that the availability of some digital resources in the lecture rooms and computer laboratories of some institutions does not automatically translate to digital inclusion, as they usually lack some functionalities that accommodate students with special needs. Thus, in some circumstances, there is need to procure bespoke devices and software and some "traditional" lecturers' hesitancy to embrace current technology due to lack of digital efficacy or ingrained scepticism (Faloye & Ajayi, 2021). Waghid and Waghid (2016) further note that the roll out of digital technology in higher education can flop, unless both practitioners and students receive effective training on current educational technology. Some disabled students are also denied academic access, because of lack of assistive technology such as braille computers and bespoke software (Purcell, 2022). This further demonstrates the hiatus between espoused and enacted practice, which disadvantages a significant part of the student population, instead of catapulting them "towards greater success and [tapping] into their potential and unique skill set" (Rafi, 2021, n.p.). This study, therefore, sought to identify and discuss institutional and practitioner technology practices in three South African higher education institutions, with a view to creating a technology usage framework that promotes equitable access to quality higher education for all students, regardless of their backgrounds.

1.4 Significance of the study

The South African higher education system is handicapped by deep-rooted access, equity and quality disparities, which particularly affect students from historically disadvantaged racial groups. This study investigated technology practices that can potentially reverse the disparities and the findings can be incorporated into inclusivity-

oriented institutional policies and practices. In essence, the exploration of inclusive technology practices has the potential to enhance student engagement, while reducing the prospects of attrition. This translates to improved educational outcomes and, consequently, high-quality educational outcomes. Quality higher education is one of the drivers of economic and social development in South Africa (NPC, 2012; Temoso & Myeki, 2023), so by investigating technology practices that promote equity, this study can add value to national human capital development endeavours. In the same vein, judicious technology practices result in increased access to quality education for the benefit of all classes, thereby bringing both epistemic and social justice and equity to formerly marginalised groups. Largely, the study has substantial implications for the development of South African higher education, as well as economic and social development, as it aims to foster technology practices that nurture the production of high-quality graduates who are locally and globally relevant.

1.5 Purpose statement

The purpose of the study was to investigate institutional and academics' technology practices and then analyse how they promoted issues of equity, access and quality. The study analysed some documented best practices that involved the use of educational technology to address hindrances to the attainment of quality education for students who come from diverse socio-economic backgrounds. The study also examined the institutional digital integration policies and related support structures and their respective roles in promoting effective digital pedagogy. Having accomplished the aforesaid, the study then provided data-driven recommendations to inform institutional technology policy and practices that promote equity, access and, ultimately, inclusive quality higher education.

1.6 Research objectives

The study aimed to achieve the following three main objectives:

- To examine the how HEI policies promote access, equity and quality in terms of digital educational technology.
- To explore the gap between espoused and enacted technology practices in different South African institutions of higher education.

- To create an integrated technology practice framework that promotes equity, access and quality in South African HEIs.

1.7 Research questions

- How do the technology practices of institutions and academics promote equity, access and quality in the South African higher education context?
- What gaps exist between espoused and enacted technology practices in different South African institutions of higher education?
- What technology practices can HEIs incorporate into an integrated framework to ensure equity, access and quality in higher education?

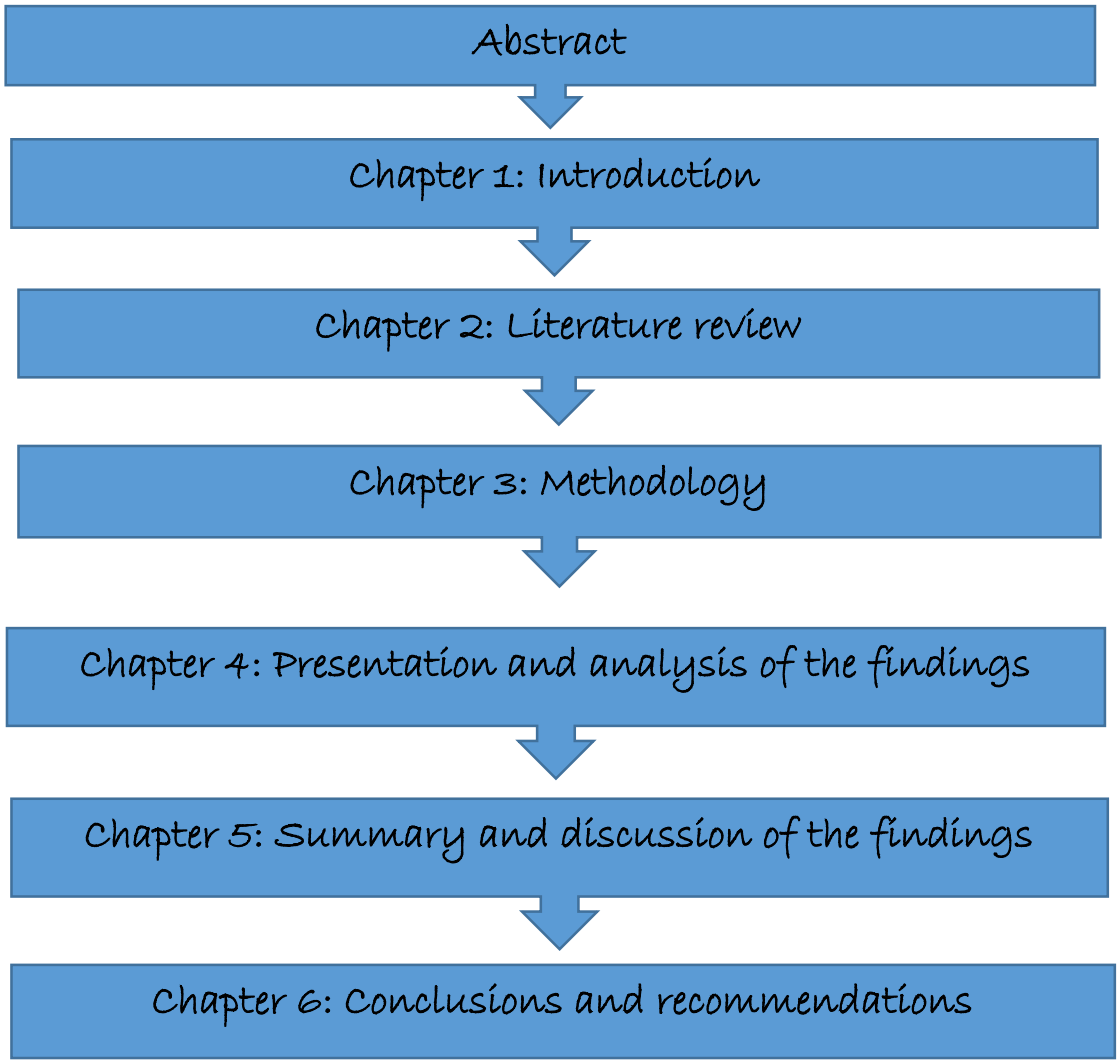
1.8 Summary

Chapter 1 outlined the background of the study, the problem statement and the significance of the study. The purpose of the study and the objectives and questions of the research were also stated. The following chapter focused on the review of related literature and the discussion of the theoretical that guided this study.

1.9 Overview of the study

This research investigated how the technology initiatives and interventions of HEIs and academics addressed existing inequalities by advancing equity, access and quality in higher education in South Africa. The study was qualitative, hence it was grounded in the interpretivist paradigm. A multi-case study strategy was used to delve into three institutional settings to explore the diversity of practices, challenges and results of technology integration. As envisaged by Heale and Twycross (2018), multi-case strategies provide a wider perspective of the research issue than single case studies.

This research report comprised six chapters namely the introduction, literature review, methodology, presentation and analysis of findings, summary and discussion, and, finally, conclusions and recommendations. A visual summary of the overview is shown on the next page.


Abstract
Chapter 1: Introduction
Chapter 2: Literature review
Chapter 3: Methodology
Chapter 4: Presentation and analysis of the findings
Chapter 5: Summary and discussion of the findings
Chapter 6: Conclusions and recommendations

Chapter 2: Literature review

2.0 Introduction

In the first part of this chapter, the key concepts of the study were discussed and contextualised. This was followed by a discussion of the underpinning theories and formulation of a theoretical framework, and finally, extant literature was reviewed. The key aim of the study was to explore how academics used technology practices to promote digital equity and access and, ultimately, the quality of education in selected South African HEIs.

2.1.1 Defining and contextualising the key concepts of the study

2.1.1.1 Technology practice

"[The] modern classroom … uses e-learning tools and Learning Management Systems that capture student cognition and engages them in the learning process via technology, while increasing their need for self-directedness" (Galy, Downey & Johnson, 2011, p.209). The citation describes trends in higher education institutions in the developed world a decade ago. To date, digital transformation continues to change the way people conduct business and, most importantly, engage in academic activities (Mayer & Oosthuizen, 2020). In the aftermath of the COVID-19 pandemic, the use of LMSs became inevitable, so higher education is currently characterised by migration to collaborative technology-mediated learning (ibid).

Prestridge (2012) defines technology practices as a combination of academics' actions and skills or aptitudes in using digital tools or pedagogies to foster effective learning, whether in the physical lecture room or virtual engagements. The range of digital tools used by instructors include the basic suite, web-based collaboration, open educational resources and mobile-based applications (Vergara, 2021). These tools enable academics to perform a number of tasks, which promote ubiquitous learning and multimodality.

Drengson (1996) concedes that technology practice is a broad concept, which includes technological tools and the actual techniques used to accomplish tasks more efficiently. Technology practice is a systematised four-dimensional activity comprising: technical knowledge and skill; organisational structures; societal or institutional needs

and values; and resource utilisation. These dimensions are harmonised and, if one were excluded or overlooked, there would be no practice to speak of. Drengson's model resonates with Rusha Mishra and Matthew Koehler's TPACK model of 2006, which stipulates three different types of knowledge (content, technological and pedagogical), which teachers/instructors must possess as prerequisites for effective technology integration in the classroom (Townsend, 2024). In other words, the availability of digital hardware and software alone cannot constitute technology practice (Ertmer *et al*., 2012). Therefore, institutions and academics ought to use technology to deliver high-quality education that meets global needs.

2.1.1.2 Technology access

The Council of Europe (2023) describes technology access in education as a user's ability to either acquire or use a computer, smartphone, tablet, applications, artificial intelligence, the internet and the internet of things for instructional or learning purposes. However, access transcends mere possession of technological devices and connectivity, which means that users should have a range of digital competences (ibid). Thus, digital access is multi-tiered. For example, physical access to technological devices and internet connection does not entirely define digital inclusion, so it is crucial for academics and students to be digitally and informationally literate as well (ibid).

Ragnedda, Riui and Addeo (2022) posit that socially vulnerable groups are generally marginalised from digital technologies, due to affordability and disability challenges. According to the social contract and the rights-based theory, the state, HEIs management and their ICTs departments and academics have different sets of responsibilities to ensure that digital pedagogy is inclusively accessible (Hohfeld, 1919; Kimball, 2018; Ramrung *et al*., 2020; Rigg, 2022). However, this objective can be handicapped by lack of professional development training, hence, some academics may be ill-equipped to integrate technology in their practices. Derting *et al*. (2016) found that most institutional training had negligible impact, due to the disjuncture between its content and the academics' training needs.

Kargol (2021, n.p.) present a bleak picture of technology access in South Africa, which reflects acute inequality, thereby having a negative impact on "digital literacy skills and … higher education." Given the aforesaid access challenges, it can be surmised that

a substantial number of students who enrolled for post-secondary education were digitally excluded in many respects and could have found it difficult to use computers and other digital devices for learning purposes (Lubinga *et al*., 2023). In practical terms, such access challenges perpetuate the inequality cycle. Hence, institutions of higher learning and academics should devise practices that can bridge any possible digital equity and access gaps that may hinder optimal teaching and learning and, ultimately, academic success.

2.1.1.3 Technology equity

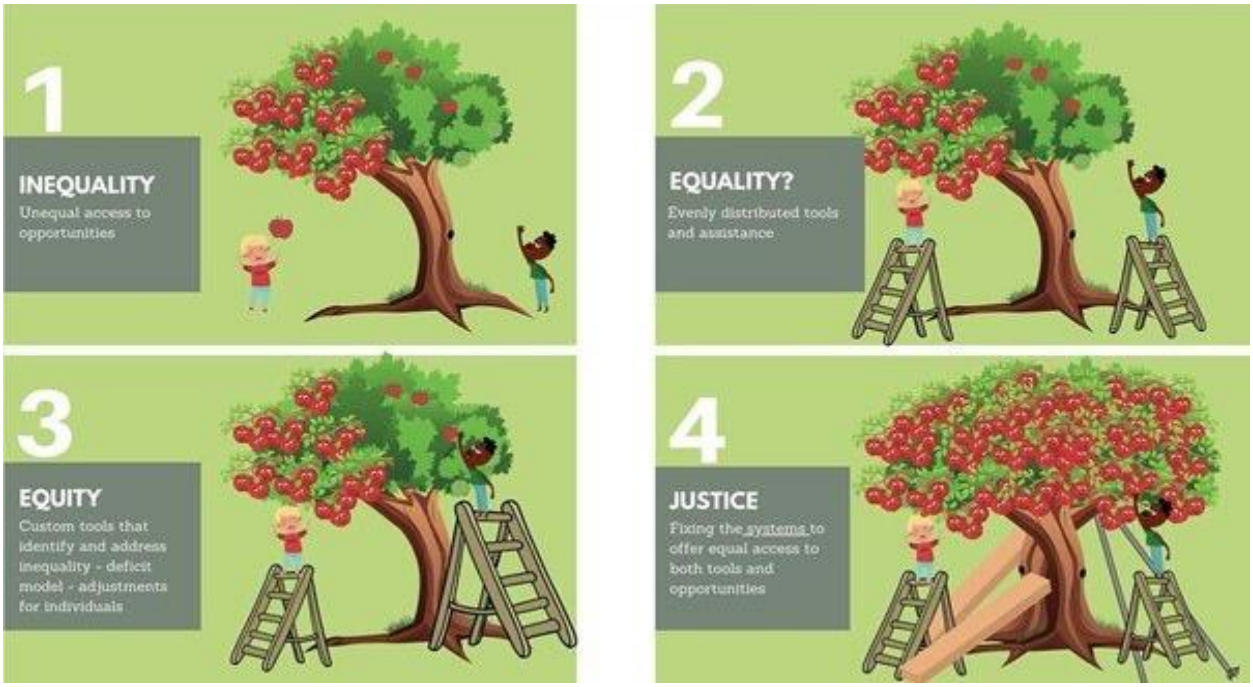
The term equity is synonymous with impartiality, fairness and justice. The corollary is that technology equity, or "techquity" refers to impartial and justice-oriented distribution of technology resources and skills to both students and academics. According to Shelton (2021), techquity entails using educational technology to support effective student engagement and dismantle any culturally or racially-related barriers that inhibit equitable access to quality education.

South Africa is regarded as "one of the most unequal countries in the world, if not the most unequal" (Francis & Webster, 2019, p. 788) and, as alluded to earlier, these inequalities manifest in all spheres of society, including higher education. It follows that some academics and students in South African HEIs have ample access to educational technology, while a substantial proportion faces a myriad of barriers, as class and capability differences are hardly considered when distributing digital resources.

Erdmann (2021, n.p.) argues that equity transcends the notions of fairness and equality, as it factors in "… differences amongst people… such as race and socioeconomic status that would require different support to ensure the same opportunity of success." This implies that striving for equality in a nation that is reeling from the effects of past and existing inequality is noble, but it is not good enough to reverse the skewed status quo. In the context of educational technology, equity refers to availing digital resources and opportunities according to one's needs rather than in equal portions. This is akin to instituting affirmative action in redressing entrenched inequality and injustice. Thus, techquity is a digital empowerment principle aimed at achieving epistemic justice "by fixing the systems in a way that leads to long-term, sustainable, equitable access for generations to come" (ibid).

The digital era, also known as the information age, is indeed driven by technology and the extent to which one can access digitally based and mediated knowledge resources certainly determines whether one is information “rich” or “poor” or “haves” and “have nots” (Lievrouw & Farb, 2005; Foley *et al.*, 2022). It is, thus, incumbent upon all the stakeholders to address the digital needs and handicaps of those in their direct spheres of influence. The image below graphically summarises the foregoing definitions.

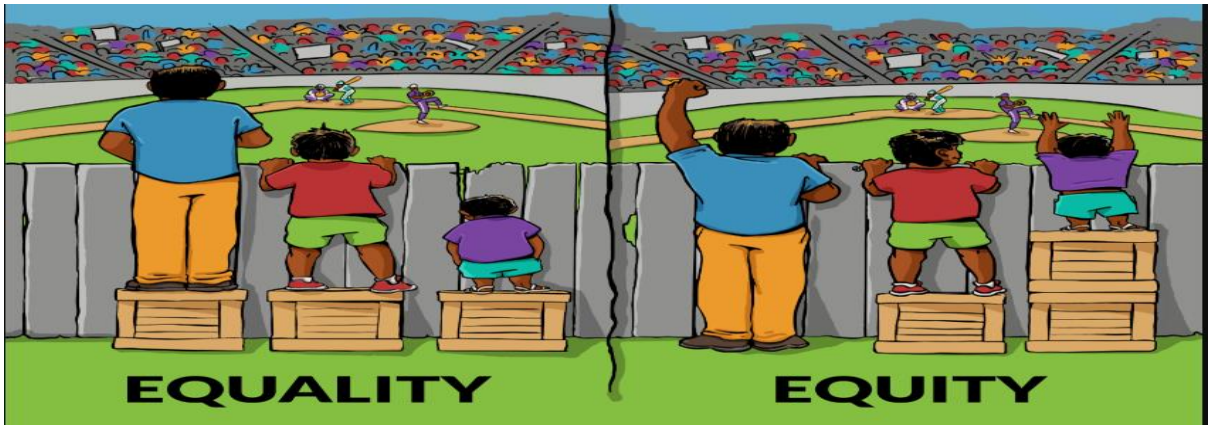
Figure 1: Illustration of key concepts



Source: University of Bath (2024)

Inequality is a condition where citizens have unequal access to resources, whereas equity provides all people with bespoke tools for reaching opportunities (University of Bath, 2024; Erdmann, 2021). Therefore, the application of homogeneous solutions does not address equity issues - it simply increases the advantages of the previously advantaged, thus, perpetuating inequity and injustice, as also illustrated in the image below (ibid). The illustration shows that justice transcends both equality and equity, as it does not only provide appropriate tools, but it fixes systems that initially cause non-equitability and inequality. Thus, while equality and equity are noble, justice is the ultimate ideal.

Figure 2: The difference between equality and equity

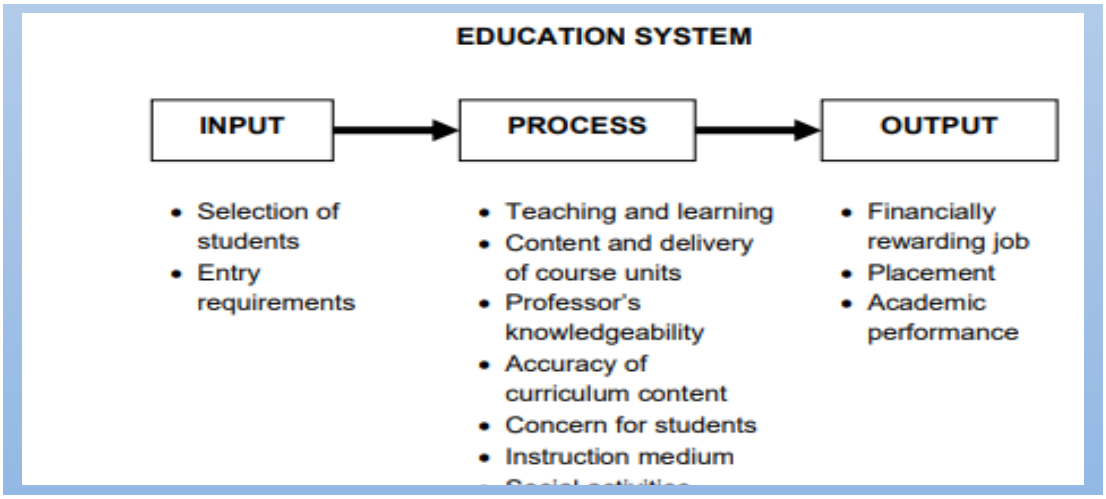


Source: Google Images

2.1.1.4 Quality

The Independent Institute of Education (IIE) (2022: p. 3) defines quality in higher education as: "Fitness of purpose of a higher education institution based on its relevance to external and internal stakeholders and commitment to transformation." Chua (2004) presented a three dimensional IPO framework, which shows how input and process interrelate in producing the desired output, which can also be characterised as quality.

Figure 3: The IPO framework



Source: Chua (2004, p. 2)

The IPO framework depicts educational quality as a measurable dimension, which is contingent on the proportionate interaction of input and process. The three aspects of output in the IPO framework are subsumed in transferable skills, as identified by UWC (2016). Thus, quality in higher education is characterised by nurturing lifelong learners and subject specialists, who are socially intelligent, innovative, and digitally literate

(UWC, 2016; Chua, 2004; University of Stirling, n.d.). In other words, the quality of one's education is evidenced by demonstrating relevant skills in authentic contexts. This is buttressed by Murire, Cilliers and Chinyamurindi (2024), who define graduateness as the competency levels that are expected from exit students in the workplace or real life situations.

On the contrary, the Bantu Education Act of 1953 was deliberately designed to deliver sub-standard education to non-White students (Ocampo, 2004; South African History Online (SAHO), n.d.), so it was devoid of quality, as it was intended to entrench inequality. In corroboration, Khumalo (2022, p. 261) the aim of Bantu Education was "to perpetuate the exclusion of certain sections of society and in these case, urban and rural black learners from receiving quality education." From the IPO framework perspective, the inputs and processes (Chua, 2004) of the Bantu education system were designed to produce "defective outputs", that is; low-skilled employees. The act of excluding individuals or groups from quality education violates both the social contract, which stipulates that the state is morally and legally beholden to deliver services to all people, regardless of race or class (Rigg, 2022). Similarly, articles 1 and 8 of the UDHR uphold the universality of human equality, and the right not to be subjected to discrimination, respectively (UN, 1948). Thus, the Bantu Education Act was both a product and progenitor of inequality.

Post-1994, South Africa witnessed an exponential rise in higher education participation compared to the pre-democracy era (Cini, 2019). This resulted in the massification of a previously exclusive niche, which also meant lowering entry requirements to accommodate a wider range of school leavers. Britain faced a similar challenge in the 1990s, which was characterised by disproportionate lecturer-student ratios, overcrowded lecture rooms, uneven access to resources and, consequently, a slump in overall standards. Implicit in this example is that opening up higher education to universal access can be an anathema to the quality of graduateness (UWC, 2016, Murire *et al*., 2022).

Ertmer *et al*. (2012) argue that mission and vision statements encapsulate institutional policies on quality assurance in course design, and management of pedagogical processes. For instance, the mission statement of the University of Pretoria (UP) (n.d.) pledges to "use quality, relevance, diversity and sustainability as its navigational markers." Likewise, the North-West University (NWU) (2012) commits to use "high

quality teaching-learning … and maintain high-quality, relevant and focused research…" These examples show that HEIs can promote quality education by making pedagogy relevant to contemporary realities. This entails employing technology-mediated instructional and assessment strategies. Buzzetto-More and Alade (2006) argue that technology-enabled assessment has comparatively more accurate, consistent and replicable. In addition, it allows for faster grading, recording and analysis of results (ibid), thus, automating significant workloads and saving academics and administrators from avoidable fatigue. Khattak, Ali and Al Awadh (2022) further argue that apart from adding efficiency to the assessment and feedback process, technology enabled assessment tools can also be adapted to proctoring and invigilation purposes.

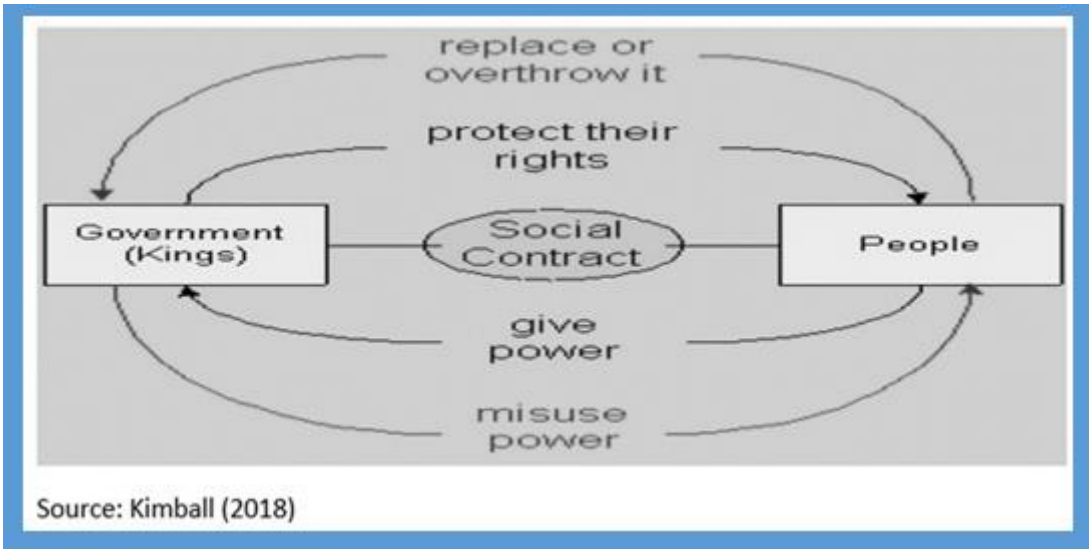
2.2 Theoretical framework

Varpio, Paradis, Uijtdehaage and Young (2020) define theoretical framework as the application of theories to create a scaffold upon which a study is grounded. This entails cogently defining and linking the key concepts and premises of the research. Theoretical frameworks rationalise the importance and relevance of a study. In this study, the theoretical framework blended two theories namely: the rights-based and the espoused and enacted practices.

2.2.1 Rights-based theory

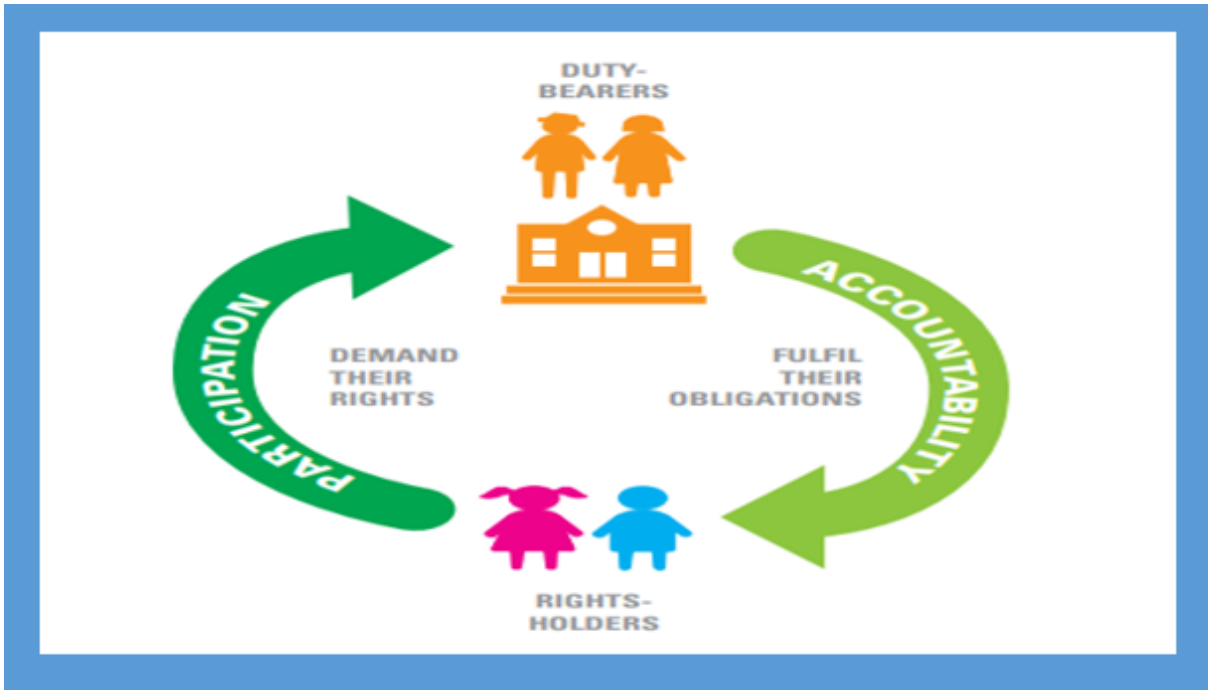
The rights-based theory can be described as an offshoot of the social contract theory, which argues that the state derives its power from the common people, so it is morally obligated to reciprocate them for entrusting it with the right and authority to preside over governance issues (Fieser & Dowden, n.d.). The main tenet of the social contract theory is the universality of justice, which pervades all facets of human engagement (Kimball, 2018), such as the higher education context. Figure 4 graphically represents Locke's conception of the relationship between the *signatories* to the social contract.

Figure 4: John Locke's social contract



In this context, the government or the state is morally and duty-bound to ensure equitable access to quality higher education by providing digital infrastructure, devices and related support to HEIs (Rigg, 2022). This argument is derived from the rights-based theory guru, Hohfeld's (1919) theory, which posits that: if person X has a claim-right [emanating from the social contract], at least one person has a duty to ensure that it is fulfilled, or not interfered with. It can, thus, be argued that higher education is a human right that ought to be upheld and protected, because it "is a public good and that it should be a universal entitlement in the same way as primary and secondary education" (McCowan, 2012, p. 111). Based on this assertion, which global free education crusaders support, it can be posited that there are economic benefits that are associated with attaining a tertiary education qualification that accrue to individuals in particular and the entire socioeconomic well-being of communities and nations in general. The corollary to this argument is that denying students equitable access to digital tools, devices and platforms on the basis of affordability constraints can be regarded as violation of human rights and dereliction of duty by the state and, ultimately, HEIs. The rendering in the diagram below depicts the rights-based theory, and clearly shows its social contract pedigree.

Figure 5: The rights-based theory



Source: Unicef Finland (2015)

The illustration above is essentially similar to Figure 1, however, it replaces **government/kings** with **duty-bearers** and **people** with **rights-holders**. The roles of the former include empowering the latter group through capacity building, thus, ensuring accountability, equality, non-discrimination and participation. In the context of this study, the key duty bearers, apart from the state, are the HEIs and academics, while the students are the primary rights-holders, who derive empowerment through unencumbered access to higher education, which is enabled through the appropriate provision of digital infrastructure, devices and software. This role is played by the HEIs, while academics and their supervisors or managers are expected to deploy technology to ensure productive or deep learning, which entails the acquisition of knowledge and skills that are relevant to authentic contexts.

The foregoing view is in tandem with the outcomes of Dee Fink's Taxonomy of Significant Learning, which recognises the cognitive, affective and meta-cognitive domains as equally important chain links in the learning process (Fink, 2003). The taxonomy identifies six types of learning, which are interactive, unlike Benjamin Bloom's and other taxonomies that render them as hierarchical (ibid). These types of learning are: **foundational knowledge, application**, **integration**, **human dimension**, **caring**, and **learning how to learn** (ibid). One can, thus, agree with Heinz

(2023), who argues that Fink's (2003) taxonomy encapsulates the notions of quality education and a paradigm shift from instructor-centred to student-centred knowledge construction, thus, encompassing some dimensions that were, until recently considered as peripheral, yet they are essential to holistic human development.

In the higher education and other contexts, of course, the provision of ICTs and associated support is foundational, as it precedes academics' and students' technology practices. The rights-based theory, therefore, advocates for equitable and humane distribution of power and resources, which is what this study seeks to establish and advocate (Spreen & Vally, 2006). This is in tandem with Stainton's (2016) view, whereby the rights-based theory morphs into an empowerment model in which education is a tool for equalising opportunities for students from different social and ability backgrounds. Judging from the foregoing assertions, digital technology practices in higher education ought to promote inclusivity rather than perpetuate elitism at the expense of students from disadvantaged backgrounds, who cannot afford smart devices, software and data. This brings to the fore the argument that the social contract places the responsibility of providing education and all its requisite tools on the shoulders of the state (Fieser & Dowden, n.d.) and, by extension, institutions and academics.

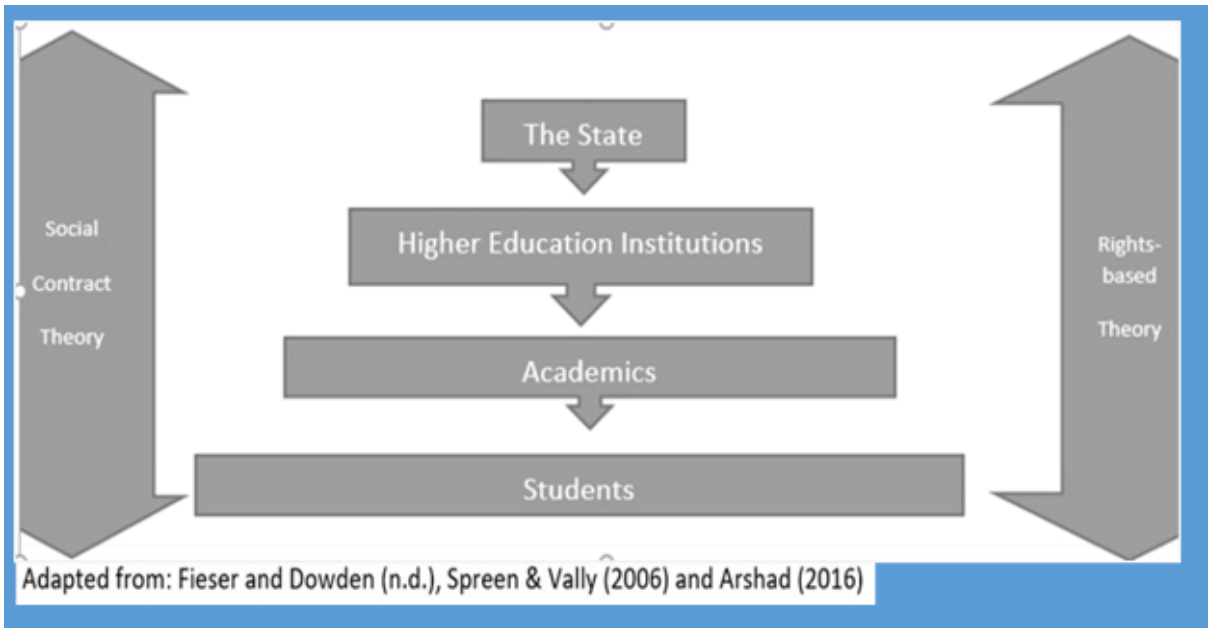
As indicated above, the rights-based theory is spawned from the social contract theory. The Universal Declaration of Human Rights (UDHR) underscores the right to education for all (United Nations (UN), 1948). However, this right is limited to basic education for children aged sixteen and below (Arshad, 2016), which implies that higher education is excluded from the purview of the UDHR, thus, freeing the state from any obligation to fund post-basic education. However, according to the social contract and rights-based theories, if the state is entitled to regulate higher education, then it is morally obligated to fund it (Rigg, 2022).

The four stakeholders that can be pinpointed from the rights-based theory are: the state, HEIs, staff and students. The first three can be classified as rights protectors, while students and society at large are the rights-bearers, whose interests and rights should be catered for and protected by the state and HEIs. This is aligned to the aim of the study namely: to identify equity, quality and access challenges to educational opportunities and, if needs be, address them through humane technology practices. In other words, the use of, and access to technology in HEIs, is not only a social

contract issue, but it is also a human rights concern, therefore, it ought to be an empowerment and enabling instrument, rather than a tool for entrenching academic inequality. Rigg (2022, p.1) emphatically asserts that: “Access to higher education should be seen as a right, and not just a privilege for the few.”

The aforesaid stakeholders in higher education have a hierarchical relationship, with the state having the general oversight role, apart from procuring the needful resources (Spreen & Vally, 2006; Arshad, 2016). The HEIs are responsible for managing these resources and channelling them for research, teaching and learning purposes. Academics then utilise the resources to fulfil the aims and objectives of higher education. The illustration below summarises the foregoing description.

Figure 6: Illustration of the theoretical framework



The social contract and rights-based theories also subsume Gilligan’s (1982) ethics of care philosophy, which postulates that true humanity should be morally bound by mutual expressions “of care and compassion for each other – and particularly those who are most vulnerable and in need … [in] online classrooms and interactions …, it means that intentional teaching and learning can only take place through relationships” (Ramrung, Frade, Marais, Govender, Cupido, Pather & Fontaine-Rainen, 2020, n.p.). It should be asserted, however, that such relationships do not just begin and end with lecturer-student engagement: they are founded by adequate provision of digital infrastructure, devices and tools by the state and HEIs. In addition, academics and

institutions ought to turn digital pedagogies into “brave spaces” for robust and constructive collaborative and individual engagement with course content (ibid).

2.2.2 Espoused and enacted practice theory

The rights-based theory cannot account for academics’ idiosyncratic digital practices, in relation to institutional policy. In study, this gap was filled by Ertmer *et al.*’s (2012) theory of espoused and enacted technology usage. Espoused practices include organisational or individual values and beliefs, which then guide practical usage or enacted practice. Thus, individual academics’ beliefs about technology can be enablers or “second-order barriers” with regard to digital adoption and usage (Ibid, p. 424). The espoused practices of a HEI are coded in the policy documents and vision and mission statements. Ertmer *et al.* (2012) articulate the espoused and enacted theory as the gap between the ideal, known and coded values and what the individual practitioners actually do in accordance with their digital efficacy and proficiency. This gap is exemplified by misalignment between academics’ practices and HEIs’ technology usage policies.

The assumption that can be drawn from Ertmer *et al.*’s (2012) theory is that, if the gap between espoused and enacted practices is narrow, there are high chances that the institutions’ and lecturers’ technology practices promote equity, access and, ultimately, quality. Thus, if quality education were to be realised, there is need for academics to adopt innovative practices that inculcate deep learning, rather than view digital technology as a mere content and knowledge transmission medium (Drengson, 1996; Fink, 2003; Foley *et al*., 2022).

2.2 Review of related literature

2.2.1 Historical overview

From 1652 to 1994, South Africa was under colonial rule and during this period racial inequality was progressively entrenched. When the ultra-white supremacist National Party came to power in 1948 racial segregation or apartheid was legislated, in the form of the Group Areas Act, Bantu Education Act and many more, which culminated in “… segregated schools and universities, and eliminated integrated public facilities and sport … labour market [protectionism in favour of Whites], and a system of influx control that stemmed from Black urbanisation, [thus leading] to the creation of designated 'homelands' for Blacks” (SAHO, n.d., n.p.). This means that, by means of

apartheid legislation, whose sole aim was to promote White, albeit Afrikaner, superiority, South Africa became unequivocally racially divided.

In 1948 South Africa had ten state-funded universities. Four of these were exclusively reserved for Afrikaners, while the other four enrolled English speaking Whites only (Ocampo, 2004). Blacks, Coloureds and Indians, still had to compete for space with Whites in the remaining two universities (ibid). This demonstrates the skewed nature of the higher education landscape, which in itself was a microcosm of a racist system. Moreover, Whites-only institutions and faculties were adequately funded, while the Black-designated institutions were deliberately starved of resources (Badat, 1999). According to Cini (2019), these practices kept black participation in higher education at a level that the regime considered as the “safest minimum”, thus, limiting chances of upward social mobility for the black population. This ensured that Whites were equipped with education and skills that prepared them to lead in all spheres of life, while the other racial groups were groomed to be loyal and subservient labourers and lowly-ranked industrial and civil service office bearers (ibid). In corroboration, Yende (2021) argues that although the current funding options such as bursaries and loans, particularly the National Student Financial Aid Scheme, have bridged the access gap to higher education, a significant quota of students from poor families is still excluded and continues to demand for free education, rather than revolving student loans.

With the advent of the democracy in April 1994, the disaffected racial groups anticipated to see a completely classless South Africa. The post-apartheid government immediately massified and reformed higher education (Badat, 1999; Cini, 2019). However, to date, there are still some structural barriers that were created and fortified during the 342 years of colonisation, 46 of which were characterised by rabid apartheid legislation (Cini, 2019). Because the democratic government could not completely overturn the legacy of apartheid, as had been widely anticipated, students from historically disadvantaged racial groups, are still largely characterised as victims of inequality or belligerent activists of equal access to higher education.

Yende (2021) notes that the cost higher education in South Africa remains beyond the reach of the majority of formerly disadvantaged people. For example, Kandie and Adeaga (2023) note that annual university tuition fees alone range from at least R33 000 to as much as R100 000, depending on the qualification and the institution. Considering that standard student accommodation, utilities and other living expenses

can exceed R4 000 per month, it is doubtless that, barring the establishment of an inclusive higher education finance scheme, the inequality gap in South Africa, where the poorest family nets about R547 per month will continue to widen (University of Johannesburg, n.d.; Private Property, n.d.; South Africa Gateway, n.d.).

In the 2020 and 2021 academic years, conventional higher education institutions were compelled to adopt virtual lectures as an emergency intervention measure. However, this brought a new set of challenges for all stakeholders, given that digital infrastructure and devices, subscriptions to learning management systems, connectivity and data all became imperative (Mhlanga, Denhere & Moloi, 2022). For some institutions, this obviously resulted in technical operational challenges, while underprivileged students, who had limited access to smart devices and data, were unable to engage in online classes, thus, exposing an unexpected digital divide. Cini (2019) attributes these challenges to the post-apartheid government's reluctance to match the massive increase in enrolment with sustainable pro-poor funding models.

The National Students Financial Aid Scheme (NSFAS) scheme is responsible for disbursing higher education financial aid. However, hitherto, the scheme has been largely criticised as a tokenist, rather than humanist initiative, as it excluded the "missing middle students" (Cloete, 2024: n.p.). Lebeau *et al*. (2012) argue that government subsidies to public universities are far short of their annual expenditure budgets, thereby limiting the institutions' abilities to build or upgrade digital capacity. This militates against digital equity and access policies, thus, compromising the quality of higher education. This status quo is patently contrary to the claim that HEIs should lead the way in transforming South Africa into an information society (Czerniewicz, Ravjee & Mlitwa, 2006).

Several South African government documents acknowledge the existence of access, equity and quality challenges in society and the higher education sector. For example, the National Planning Commission's (NPC) (2012) and the Department of Higher Education and Training's (DHET) (2013) note that the foremost role of higher education is to redress historical social injustices and promote universal participation and inclusivity. Mzangwa (2019) posits that the role of higher education in the post-apartheid South Africa is to usher in social transformation by dismantling the vestiges of colonialism and racial segregation. In other words, higher education is expected to

disrupt the deeply rooted social, political and economic equity and injustices that still permeate all facets of modern day South Africa.

Regardless of increased participation, student success and graduation rates have been extremely low, thus countering the higher education transformation objectives of the post-1994 government (Cini, 2019; Faloye & Ajayi, 2021). These challenges can be mitigated by enhancing the use of ICT-mediated higher education and this requires massive capacitation (DHET, 2013). This is an unequivocal acknowledgement that technology enhances the quality of higher education (Lubinga *et al*., 2023) and increases participation rates.

2.2.2 The impact of technology on teaching and learning in higher education

Altbach (2011) and Lubinga *et al.* (2023) suggest that the technology practices of institutions and academics determine the levels of their commitment to bridging the digital divide in academia. Institutional practices are products of the deliberate actions and strategies of internal and/or state-appointed policy makers, rather than the idiosyncratic practices of individual academics (Cross & Adam, 2007). Institutional policies determine the extent to which the executive management invest in relevant digital infrastructure and devices (Drengson, 1996). The South African government acknowledges the need to increasingly embrace technology and innovation to redress past and present inequalities (Department of Science and Technology (DST), 2019; National Planning Commission (NPC), 2011). South African HEIs seem to have embraced the NPC (2012) and DST (2019) blueprints by creating dedicated centres to drive their digital innovation programmes. However, Lubinga *et al*. (2023) note that although most South African HEIs, especially state universities, have embraced technology transformation, they do not have corresponding skills plans for effectively on-boarding of academics.

Scholars (Lievrouw & Farb, 2005; Ertmer *et al*., 2012; Costley, 2014; Pinto & Leite, 2020; Ndlovu & Moll, 2016; Moll *et al*., 2022) generally agree that technology improves academics' and students' experiences, however, they caution that this can be optimally achieved by reducing different levels of access barriers. For example, academics should use technology to promote active learning and not as a mere medium of instruction or content repository. In this regard, Ertmer *et al*. (2012), Costley

(2014) and IIE (2023) all acknowledge the importance of designing immersive digital content and activities. Costley (2014, p. 2) posits that judicious integration of technology "causes students to be more engaged [and] retain more information." Further, technology increases "student collaboration ... hands-on learning opportunities … confidence … and … technology skills" (ibid, p. 9).

The aforesaid skills are consistent with the aforementioned graduate attributes of quality higher education, thereby leaving no doubt that technology can enhance academic success and reduce lecturers' workloads. Pinto and Leite (2020) corroborate the foregoing by positing that LMSs and other ICTs enable lecturers to share content, activities, assessments and feedback remotely, thus, enabling synchronous and asynchronous engagement. However, some academics use "digital technologies to support more transmissive ways of teaching [rather than promoting] collaborative and cooperative learning" (ibid, p. 347). This finding buttresses the notion that, even in digitally-mediated teaching and learning contexts, the lecturer sets the pace for significant learning, which is consistent with the principles of constructive discovery learning (Alfieri *et al*., 2011). This entails using flipped classroom and just-in-time approaches, whereby students use digital tools to breakdown content prior to presenting their findings in class (ibid). Thus, constructivist strategies "change in the roles of teachers and learners, and the equitable access to higher education" (Pinto & Leite, 2020, p. 348).

Institutional teaching and learning with technology policies mainly cite LMSs as their flagship interactive teaching and learning media. LMSs are also used for assessment creation and completion, content sharing and administration purposes. Pinto and Leite (2020) urge academics and institutions to harness other digital platforms, such as Google Classroom, Zoom, Facebook, WhatsApp and TikTok as alternatives to traditional LMSs. Such media can be used to send alerts whenever content or activities are uploaded on the official LMS. One advantage of doing so is that messages can be accessed in real time, thus, helping students to remember important schedules, which minimises late or non-submission.

Thus, HEIs policies that restrict academics to using the institutional LMSs militate against quality student engagement and "flexible … content sharing, connection and communication" (Pinto & Leite, 2020, p. 349). Using multiple digital channels and devices promotes pedagogical hybridity and student-centred engagement. This is

supported by Ertmer *et al*. (2012), who state that quality higher education is a product of student-centred learning. In this case, classroom technology develops "thinking skills [that enable students] to solve problems and do useful work" (ibid, p. 424).

2.2.2.1 Academics' technology practices

The term academics is used to refer to lecturers and academic managers, supervisors or coordinators. Ertmer *et al.* (2012) argue that academics' adoption of technology is influenced, firstly by their digital competence levels and, secondly, perceptions its impact on their practices. Academics who view technology as an essential curriculum driver willingly use it for course preparation and facilitation, whereas those who regards it as intrusive are reluctant to adopt it (Liu, 2011; Ertmer *et al*., 1999; 2012). Perceptions of the value of pedagogical technology are classified as espoused practices, while the practical implementation of these espoused practices is known as enacted practices (Ertmer *et al*., 2012).

Thus, it can be submitted that the rate of technology adoption and usage is proportional individual academics' digital efficacy. For example, novices shun technology or use it minimally, while expert users use it more frequently and more productively (ibid). Thus, academics' digital practices define the trajectory and depth of students' engagement via digital tools. More often than not, these practices are determined by one's proficiency (Vergara, 2021). Thus, there is an unambiguous connection between lecturers' enacted practices and student learning. Consequently, facilitators who place high value on technology integration eventually become expert users, while those with digital anxiety and hesitancy remain non-users or novices (Ertmer *et al*., 1999, 2012).

Espoused technology practices are rooted teaching philosophy, that is; how one perceives the dynamics that define pedagogy, either through behaviourist and/or cognitivist lenses. The former category begets transmissive approaches, while the latter influences constructivism and connectivism. Behaviourism-oriented approaches regard academics as infallible fountains and dispensers of knowledge and rewarders of *correct* behaviour, while cognitivist philosophies view them as co-participants in the process of knowledge construction (Tritsch, 2021). Consequently, learning is regarded as an incidental or direct consequence of academics' philosophical lenses and this resonates with Ertmer *et al*.'s (1999; 2012) argument that the teacher, not technology, drives digital integration.

Cognitivism posits that learning is a function of the brain, not primarily imitation or physical habit, thus, the exponents of the approach use non-linear instructional methods that foster active, immersive and deep learning practices (Tritsch, 2012; Fink, 2003). In the same vein, constructivist technology practices promote authentic knowledge construction through project and problem-based learning, thus, HEIs should incubate technology practices that are responsive to extant existential realities, such as addressing the plight of historically disadvantaged people (Francis & Webster, 2019; Erdmann, 2021). Czerniewicz *et al*. (2020) regard the constructivist approach transformative, but its existence and practice are hampered by lack of equitable access to technological resources. For example, it is not uncommon to see academics and students who have minimal prior exposure to computers. During the transition to ERT and beyond, this cohort experienced a myriad of digital skills-related barriers that hindered both their access and performance (Lubinga *et al*., 2023; Purcell, 2022).

Further, Seepe (2017) argues that skewed power relations hinder disadvantaged groups from accessing high-quality higher education. This reveals a disjuncture between the national and institutional digital transformation trajectory and "the socio-economic and cultural challenges faced by the African majority" (ibid, p. 121). Ideally, higher education and socio-economic transformation thrusts should be complimentary, not mutually exclusive (Czerniewicz *et al*., 2020; Seepe, 2017). Thus, if the state and institutions equitably invest in digital transformation, the existing gaps can be narrowed rapidly.

Technology has a massive impact on all facets of higher education, however, some experts insist that its importance should not be elevated beyond being a mere instructional medium (Waghid & Waghid, 2016). Arguably, this is a simplistic view that overlooks the catalytic nature of digital resources in promoting deep learning, which inculcates a host of desirable graduate skills (UWC, 2016; University of Stirling, n.d.). Moreover, technology fosters multimodal learning, which, from a cognitive perspective, helps students to grasp and conceptualise content and concept with relative ease (Tritsch, 2021; Archer & Newfield, 2014). Nevertheless, it should be borne in mind that pedagogical media do not necessarily change the content or practitioners' pedagogical philosophies and practices. The implication is that the best technology in the hands of a rigidly instructivist academic may have less impact than rudimentary educational technology in the hands of a transformative educator.

2.3 Summary

The chapter began by conceptualising the key concepts of the study, such as technology practice, equity, access and quality. The next section presented and discussed the theoretical framework that provided the lens for understanding the phenomenon of the study. Lastly, the literature review section presented and critiqued various authors' views technology practices in higher education.

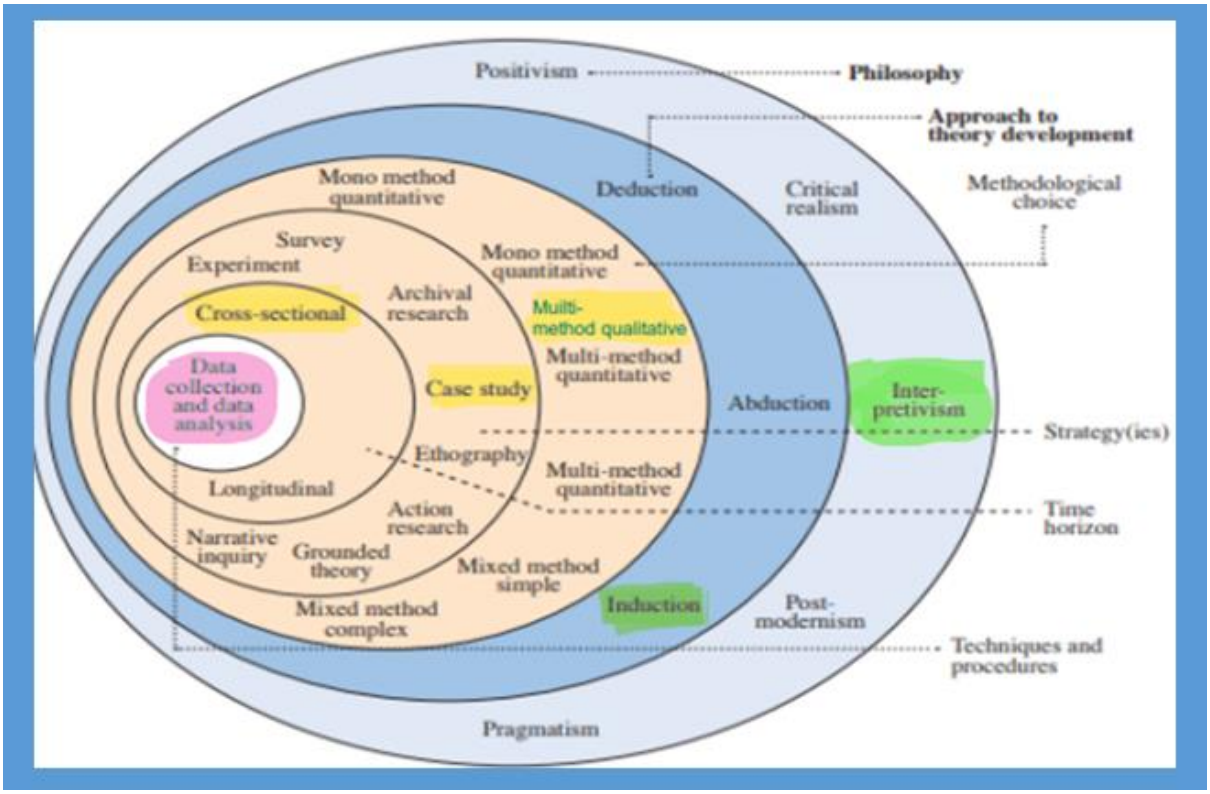
The next chapter focused on the methodology of the study.

Chapter 3: Methodology

3.0 Introduction

This chapter presented and rationalised the research design, paradigm, population, sampling techniques and data collection and analysis tools that were used in this study. The chapter also outlined the ethical considerations of this study. The research methodology was structured according to Saunders *et al*. (2007) research onion, which is shown in Figure 7 below.

Figure 7: The research onion



Source: Saunders *et al*. (2007)

As shown above, the research onion has six inter-closing circular rings or layers namely: philosophy**,** approach to theory development, methodological choice, strategy/strategies, time horizon, and lastly, techniques and procedures.

3.1 Research philosophy

Saunders *et al.* (2007) define research philosophy or paradigm as structured conventions designed to aid researchers' understanding of problems and worldviews when conducting structured research. Researchers view phenomena through interpretivist, positivist, pragmatist and critical realist paradigms (Saunders *et al*.,

2007). This study adopted the interpretivist paradigm, whose premise is that qualitative data are subjective and descriptive, so they are ideally interpreted through inferences or generalisations (Rehman & Alharthi, 2016). Interpretivism holds that there are multiple realities, which are all based on individuals' subjective views (Ibid). Since the participants of this study answered questions pertaining to their own technology practices, experiences and perceptions, the emergence of multiple subjective realities was inevitable. The interpretivist paradigm was the most suitable lens for this study, which contained narrative data.

3.2 Approach to theory development

Researchers can base their data collection and analysis choices on either the inductive or deductive approaches to theoretical development (Saunders *et al*., 2007; Phair & Warren, 2021). These choices are logically contingent upon the selected research paradigm, strategies and procedures, among other considerations. Since this study was qualitative, it was underpinned by the interpretivist philosophy, so the researcher adopted the inductive approach to data interpretation and analysis, which entails teasing or squeezing out meaning from phenomena. Thus, when using the inductive approach, data collection, interpretation and analysis precede theory formation, unlike in the deductive approach, which begins with a foundational theory (Phair & Warren, 2021).

3.3 Methodological choice

The study adopted the qualitative methodology, whose methods are designed to collect in-depth information from individuals or groups, whose viewpoints are foundational to understanding non-quantitative phenomena (Saunders *et al.*, 2007). Hence, the methodological choice is compatible with social and behavioural sciences, into which this particular study fits. The methodological choice is generally compatible with the interpretivist paradigm, the deductive approach, the case study strategy, and related qualitative techniques and procedures, however, it is not entirely precise.

Qualitative data are collected from people, who are invariably biased, therefore, the qualitative approach is subjective and this limits the trustworthiness and generalisability of the findings (ibid). However, to mitigate these weaknesses, Saunders *et al.* (2007) and Ranjit (2012) recommend that the transferability, confirmability, credibility and dependability of the findings of qualitative studies can be

enhanced by triangulating data collection methods and foregrounding theories. Thus, to ensure rigour and validity of collected data, this study used data triangulation and a theoretical framework foregrounded in the rights-based and espoused and enacted theories (Ertmer *et al*., 2012; Spreen & Vally, 2016; Arshad, 2016). For example, analysis of published sources was used in conjunction with data from the open-ended questionnaire.

3.4 Research strategy

A multi-case study was used as the main data collection strategy of this research. Data collected from academics were complemented by analysis of published sources from each of the three case study HEIs, two of which were public universities, while one was a privately-owned institution. The institutions were not homogeneous and they were purposely sampled based on their respective unique characteristics, which were outlined in chapter 4. The following code names: HEI1 (independent), HEI2 (traditional university) and HEI3 (comprehensive university), were used to identify each case study HEI.

A case study is a simple way "of conducting research as it involves a deep dive and thorough understanding of the data collection methods and inferring the data" (QuestionPro, n.d., n.p.). Therefore, multi-case research strategies are used to collect data from multiple research sites, as opposed to only one. Heale and Twycross (2018, p.7) argue that although collecting data from multiple sites is challenging, it often yields "stronger and more reliable [evidence] than … single-case research… [and] allows for more comprehensive exploration of research questions." Thus, the findings of this study were diverse and comprehensive in manifold ways, as the participants were sampled from three distinct HEIs. Besides, participant bias was countered by data triangulation, which entailed analysis of published institutional documents.

3.5 Time horizon

Time horizon refers to cross-sectional or longitudinal durations over which data are collected (Saunders *et al*., 2021). The cross-sectional time horizon is suitable for collecting data over a short period, while longitudinal time horizons are ideal for investigating transient concepts that are prone to change over a relatively long period (ibid). In this study, the cross-sectional time horizon was chosen because the data

collection period was limited to approximately four calendar months and the study focused on the technology practices of academics and institutions at the material time.

3.6 Techniques and procedures

Phair and Warren (2021) describe this layer as the centre of Saunders' research onion, which comprises the data collection and analysis methods, and the population sampling techniques.

3.6.1 Population and sampling techniques

Casteel and Bridier (2016, p. 343) view the population of the study as "the individuals, dyads, groups, organisations [which the researcher] seeks to understand" and to whom the findings of the study can be generalised or attributed. Populations can further be whittled down to the target population, from which a study sample is derived. The target population of this study comprised academics and their respective Gauteng province-based HEIs. From the target population, a representative sample was selected using purposive non-probability sampling techniques. In non-probability sampling, the potential participants do not have equal chances of being selected to participate in the study, since they are selected according to pre-set criteria (Simkus, 2022).

The participants from the private higher education institution were conveniently sampled, since they work with the researcher, while six of the targeted public universities academics were snowball-sampled with the help of one of the researcher's contacts from each of the sampled public universities. Both the contacts also participated in the study. Four academics from each case study institution were invited to participate in the study, thus, a total of twelve questionnaires were emailed and/or forwarded by the researcher and the two contacts. At least one participant from each HEI had to be either a programme coordinator, academic manager or supervisor. The common inclusion criterion for all non-managerial participants was that they were lecturers in any faculty or discipline.

3.6.2 Data collection methods

Data collection is a systematic process in which different techniques are used to assemble research evidence using "surveys, interviews, observations, focus groups, experiments, and secondary data analysis" (QuestionPro, n.d., n.p.). This study utilised two data collection methods namely: analysis of published sources and open-

ended questionnaires. The published sources included policy documents on technology integration in pedagogical processes and professional development training.

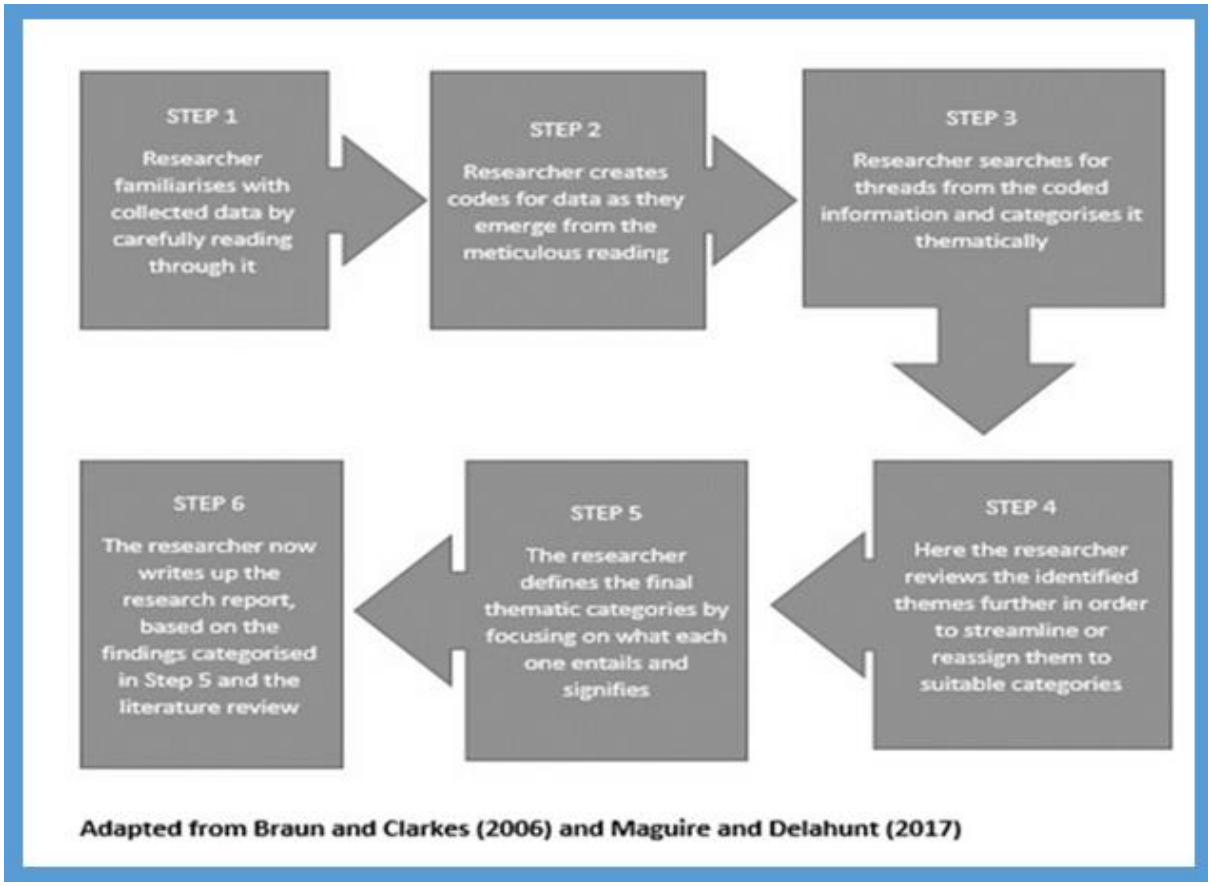
In addition, data were collected data using open-ended questionnaires. Reja *et al.* (2003, p.159) posit that open-ended questionnaires enable researchers "to discover the responses that individuals give spontaneously; [thus avoiding] the bias that may result from suggesting responses to individuals." Open-ended questionnaires are ideal when it is not feasible to conduct structured interviews. The technique can yield data that delve into the participants' views, however, they do not allow for follow-up questions (Reja *et al*., 2003). Such a challenge, coupled with unfavourable return rates, can be mitigated by using snowball sampling, which directly targets candidates, unlike random mass questionnaire distribution (Bowen, 2009). In this study, the researcher avoided lengthy and complexly-worded questions, thereby countering the possibility of misinterpretations and withdrawal from participation (Reja *et al*., 2003).

The questionnaire was developed on Microsoft Forms and it consisted of twenty questions, nine of which were closed-ended and eleven were open-ended. The first category of questions elicited the biographical data of the participants, while the second required detailed answers pertaining to the academics' and their institutions' technology practices. The participants' ages ranged from the 24 - 34 up to the 56 - 65 categories.

3.6.2 Data analysis methods

This study employed thematic analysis (TA) to analyse collected data. The technique involves creating codes, categories and thematic matrices. Braun and Clarke (2006) The thematic analysis process comprises six steps, each of which relates to the trends that emerge from the data. In this study, data from published sources were analysed by exclusively coding parts of the text aligned to the research aim and questions. The codes were further scrutinised using systematic textual analysis, after which all the data were processed in the same format. The TA framework is depicted in Figure 8 below.

Figure 8: Thematic analysis framework



To begin the data collection process, as depicted in Figure 8, the open-ended questionnaire links were emailed to all the prospective participants who met the inclusion criteria. As per the first step of Braun and Clarkes' (2006) thematic analysis framework, the researcher read through each returned questionnaire to understand each participant's overall perceptions in terms of technology practices. In keeping with the second step, the researcher created codes to describe the emerging thematic trends pertaining to academics' technology practices. For example, the common codes that emerged from published sources or archival research included institutional responsibilities and policy explicitness and/or gaps.

With regard to data that were collected using open-ended questionnaires, the key codes included digital efficacy, perceptions on effectiveness, challenges and solutions. Next, the researcher searched for any common threads that emanated from the codes and established the dominant themes, which were then further reviewed and, where necessary, re-categorised. In the fifth step, the final categories of the emerging themes were categorised. Finally, the themes were merged into nine broad categories, with distinct subheadings and/or sub-subheadings.

3.7 Ethical considerations

Observing research ethics protects participants from harm, while and after participating in the study (Macquarie University, n.d.). Thus, before collecting data for this study, the researcher applied for ethical clearance from the University of the Witwatersrand. Similarly, clearance and consent were sought from the participating HEIs and academics, respectively. The participants were briefed on the purpose of the study and their rights before they signed the consent forms. The researcher also upheld the principles of academic and data integrity by refraining from plagiarism and misrepresentation of data (Siewierski, 2020). None of the participants was coerced to participate in the study. In addition, all returned questionnaires were treated confidentially, according to the Data Protection Acts of 1988 and 2003 (Law Reform Commission, 2016). Finally, the institutions' and the participants' identities were anonymised in order to avoid any possible prejudice or harm (Macquarie University, n.d.). In the data presentation and analysis chapter, the pseudonyms HEI1, HEI2 and HEI3 denoted the case study institutions, while HEI1LS1, HEI2LS or HEI3L2, for example, were used to identify the participants according to their institutions.

3.8 Summary

Chapter 3 presented the methodology, which included the research philosophy, population and sampling, data collection and analysis methods. Interpretivism was adopted as the guiding philosophy of this qualitative study. Analysis of published sources and open-ended questionnaires were the main data collection techniques, while thematic analysis was employed for data analysis. Finally, the chapter identified and discussed the ethical considerations of the study.

Chapter 4: Data presentation and analysis of findings

4.0 Introduction

The study explored the technology practices of institutions and academics, with particular regard to how they promoted access, equity and quality. In this chapter, the data from published sources and open-ended questionnaires were presented, interpreted and analysed thematically, while the rights-based and espoused and enacted practices-oriented theoretical framework was the guiding lens. The analysis of published sources entailed perusing through the ICTs integration policies of the three case study institutions to establish their technology practices. Four academics from HEI1, and three each from HEI2 and HEI3 completed the open-ended questionnaires. The pseudonyms that the researcher used to denote the participants and their respective institutions were shown in Table 1 below. The participant's core responsibilities were also indicated and this helped to pinpoint the context of each individual's technology practices.

Table 1: Code names of the participants and HEIs

Participants	HEI	Core responsibilities
HEI1L	HEI1	Lecturing only
HEI1LS1	HEI1	Lecturing and supervising lecturers
HEI1LS2	HEI1	Lecturing and supervising lecturers
HEI1LS3	HEI1	Lecturing and supervising lecturers
HEI2L1	HEI2	Lecturing only
HEI2L2	HEI2	Lecturing only
HEI2LS	HEI2	Lecturing and supervising lecturers
HEI3L1	HEI3	Lecturing only
HEI3L2	HEI3	Lecturing only
HEI3SM	HEI3	Supervising and managing academics only

The participants' code names were coined from the code names of their respective institutions and their own responsibilities. For example, HEI1L was used to denote an academic from HEI1 whose sole responsibility was lecturing. In addition, HEI2LS denoted a participant from HEI2, who had dual responsibilities namely: lecturing and supervising other lecturers. Lastly, HEI3SM denoted an academic manager from HEI3, who did not have any lecturing duties.

4.1 Participants' biographical data

This subsection was based on seven categories of the participants' biodata namely: gender, age, core responsibilities, types of HEIs, teaching/lecturing experience, highest qualifications and areas of specialisation.

4.1.1 Gender

Table 2 below showed the distribution of the participants according to gender. Of the four female academics who were sampled, only two completed the questionnaire. All the eight male academics who were invited to take part in the study accepted and duly participated.

Table 2: Participants' gender

Gender	HEI1	HEI2	HEI3	Total
Male	HEI1L HEI1LS1	HEI2L1 HEI2L2 HEI2LS	HEI3L2 HEI3L1 HEI3SM	8
Female	HEI1LS2 HEI1LS3			2

Some prior studies, notably Lubinga *et al*. (2023), found that gender had significant effect on technology usage patterns, even it teaching and learning spaces. However, this study found no such gender-based peculiarities. Therefore, the gender descriptor was included in the research report as a demographic indicator only.

4.1.2 Age

Table 3: Participants' age groups

Age Group	HEI1	HEI2	HEI3	Total
24 - 34	HEI1L HEI1LS1 HEI1LS3			**3**
35 - 45	HEI1LS2	HEI2L1	HEI3L2	3
46 - 55		HEI2L2	HEI3L1	2
56 - 65		HEI2LS	HEI3SM	2

There were three participants in the 24 - 34 age group and all were affiliated to HEI1. Interestingly, all of them expressed confidence in their digital competence. The other seven participants were all aged between 35 and 65, with three in the 35 – 45 range and two each in the 46 - 55 and 56 – 65 categories. The three academics who described their digital efficacy as moderate are all in the last two age ranges and this resonates with Lubinga *et al*.'s (2023) study which found that the younger generation (digital citizens) had more technology affinity than older generations (digital immigrants). However, one participant in the 56 - 65 age stated that he was an expert user and this is consistent with his stated area of specialisation (information technology).

4.1.3 Areas of responsibility

Table 4: Participants' areas of responsibility

Areas of Responsibility	HEI1	HEI2	HEI3	Total
Lecturing only	HEI1L	HEI2L1 HEI2L2	HEI3L1 HEI3L2	5
Lecturing and supervising academics	HEI1LS1 HEI1LS2 HEI1LS3	HEI2LS		4
Supervising/Managing Academics only			HEI3SM	1

Five academics (HEI1L, HEI2L1, HEI2L2, HEI3L1 and HEI3L2) were solely responsible for lecturing, while four (HEI1LS1, HEI1LS2, HEI1LS3 and HEI2LS) held both lecturing and supervisory/programme coordination roles. Only one participant (HEI3SM) had an exclusively supervisory/managerial responsibility. Thus, the majority of the participants had hands-on classroom responsibilities. All the participants had at least basic proficiency in using digital technology for course design, teaching, and assessment.

4.1.4 Teaching/lecturing experience

In terms of primary and/or high school teaching experience, five (HEI1L, HEI1LS2, HEI1LS3, HEI2L1 and HEI3L2) of the participants had never worked in either of the two sectors. HEI1LS1 and HEI3L1 had each taught in the basic education phase for 2 - 4 years and 5 - 7 years, respectively. HEI2LS, HEI2L1 and HEI2L2 had all clocked a minimum of eight years' experience as school teachers, prior to teaching in the higher education context. With regard to higher education teaching, the participants' experiences ranged from two to over eight years. The participants' working experiences in either basic or higher education were summarised in Table 5 below.

Table 5: Participants' teaching/lecturing experience

Education sector	None	Up to one year	2 – 4 years	5 – 7 years	8+ years
Primary/high school	HEI1L HEI1LS2 HEI1LS3 HEI2L1 HEI3L2		HEI1LS1	HEI3L1	HEI2LS HEI2L1 HEI2L2
Sub-total	5	0	1	1	3
Higher education			HEI3L2	HEI1L HEI1LS1 HEI1LS2 HEI2L1 HEI2L2	HEI1LS2 HEI2LS HEI3L1 HEI3SM
Sub-total	**0**	**0**	**1**	**5**	**4**

The distribution in the above table is significant, as it showed that the participants brought varied experiential backgrounds to the HEI context. However, the research results showed that prior work experience had no significant impact on academics' views of the effects of technology on classroom strategies and overall practices. However, the differences were more or less detected in the diction used to describe the value of pedagogical technology and idiosyncratic strategies, rather than in principle. Although five of the academics (HEI1L, HEI1LS2, HEI1LS3, HEI2L1 and HEI3L2), had no teaching experience in the basic education sector, their levels of awareness of pedagogical concepts and beliefs (espoused practices) pertaining to teaching and learning with technology did not differ with those of their counterparts who had experience in that sector. This may be attributed to the implementation of

professional development and training programmes, which were alluded to in all the published institutional sources.

4.1.5 Academic qualifications

As shown in the Table 7 below, six of the participants had PhDs and all of them were working at the two sampled public universities. Three participants namely: HEI1L, HEI1LS1 and HEI1LS2, had honour's degrees, while only one, HEI1LS3, had a postgraduate diploma. All the academics in the latter two categories were employed at the only PHEI in the multi-case study. These statistics demonstrated that the participants were generally well-educated, as could be expected of academics in the HEIs context.

Table 6: Participants' academic qualifications

Qualifications	Honour's	Postgraduate diploma	PhD
Participants	HEI1L HEI1LS1 HEI1LS2	HEI1LS3	HEI2LS HEI2L1 HEI2L2 HEI3L1 HEI3L2 HEI3SM
Total	3	1	6

The findings of the study indicated that academics' technology practices were not essentially qualifications-based, but they could also be attributed to the levels of exposure to ICTs during the participants' schooling and undergraduate years. For example, the three academics (HEI2L2, HEI2LS and HEI3SM), who had moderate digital efficacy, were all PhD holders and they were in the 35 – 45, 46 – 55 and 56 - 65 age ranges. Given their approximate ages, it can be inferred that the participants had little or no experience with digital pedagogy in their basic and tertiary education years. In addition, the programmes they studied at the material time may not have had

any digitally-related courses. HEI2LS and HEI3SM classified their digital skills as moderate, while HEI2L2 described his as rather good, although he was not abreast with some emerging trends. This reality justifies the calls for regular tailor-made professional development training, as also alluded to in both the literature (NPC, 2012; Derting *et al*., 2016) and the findings of the study.

4.1.6 Areas of specialisation

According to the data in the table below, five of the participants (HEI1LS3, HEI2L1, HEI2LS, HEI3L1 and HEI3SM) specialised in the STEM disciplines, while only one (HEI1L) studied in the humanities, arts and languages cluster. Two of the participants (HEI1LS1 and HEI1LS2) specialised in education, while the other two (HEI2L1 and HEI3L2) indicated their specialisations as *Other*.

Table 7: Participants' areas of specialisation

Specialisation	Participants	Total
STEM	HEI1LS3 HEI2L1 HEI2LS HEI3L1 HEI3SM	5
Humanities, arts and languages	HEI1L	1
Education	HEI1LS1 HEI1LS2	2
Other	HEI2L1 HEI3L2	

Based on some of the participants' responses, the academics' areas of specialisation did not have a significantly huge bearing on their beliefs about technology usage in the classroom, as well as their strategies. However, HEI1LS1 and HEI1LS2, who

specialised in education, provided relatively more comprehensive and technically nuanced responses pertaining to the strategies, benefits and challenges of using pedagogical technology. In addition, their responses reflected in-depth understanding of pedagogical discourse. However, HEI1LS3 and HEI2LS2, whose specialisations are in the STEM field, demonstrated similar beliefs, in spite of using less technically accurate terms to describe their espoused and enacted practices.

4.2 The case study institutions

HEI1 is an entity of a publicly-listed education and training company and it has multiple institutions operating under different brand names. The company also has foothold in three other African countries and it offers both face-to-face and online distance programmes, ranging from higher certificate (SAQA NQF Level 5) up to bachelor's degrees (SAQA NQF Level 7). Two brands, one of which is a fully-fledged university, have programme offerings that go up to post-graduate level, that is; SAQA NQF Levels 8 to 10. The case study campus, which has an enrolment of more than 10 000 full-time students, is situated in Johannesburg and its programme offerings range from higher certificate to bachelor's degrees.

HEI2 is a century-old public traditional university, which was a bastion of English culture during the apartheid era, although it enrolled non-Whites as well (Morrow, 2002). Therefore, like some historically black universities, HEI2 experienced some political liberalism (ibid). HEI2 is one of the highest ranked universities in South Africa and globally and, at national level, it is arguably one of the most cosmopolitan, as it has a substantial tranche of international students and academics. According to the published sources, the university offers over 3 600 qualifications, from short courses to PhD, of which it has a relatively high output.

HEI3 is a comprehensive public university located in Johannesburg. It evolved from the amalgamation of different colleges to become an internationally renowned institution with multiple campuses, faculties and schools. Kieltyka (2023) describes a comprehensive university as a research-oriented HEI offering a wide range of undergraduate, postgraduate and professional degrees. With a massive enrolment of more than 50 000 students, HEI3 is an internationally recognised, inclusive and transformational university that seeks to serve humanity through innovative and collaborative knowledge construction. The institution offers undergraduate, postgraduate and short courses to full-time, part-time and distance learning cohorts.

Given South Africa's history of racial segregation and inequality, the published sources claim that HEI3 intentionally strives to use pedagogical technology, including artificial intelligence, to drive its higher education transformation and decolonisation agenda.

4.3 Overview of the findings

The study explored the technology practices of three case study HEIs and selected academics. The findings of the study were split into two main categories namely: institutions' and academics' technology practices. The espoused technology practices were primarily enshrined in institutional technology integration policies. All the published sources, ranging from prospectuses, policy documents and websites, invariably showed that all the three institutions regarded digital technology as an integral part of the modern classroom. Thus, in principle, all the case study institutions were committed to providing the necessary digital capacitation, including upskilling their academic staff. HEI3, for example, had already crafted an additional policy to cater for generative artificial intelligence as a knowledge construction tool. This is a pro-active decision because generative AI, in spite of some ethical challenges, provides ease of access to information, thus, promoting access, equity and quality in its own way.

4.4 Analysis of data from published sources

In this section, data from the published sources of each case study institution were presented and analysed separately, rather than on a thematic basis. As indicated in the previous sections, the relevant data were collected through the analysis of archival data from institutional websites, prospectuses and policy documents.

4.4.1 HEI1 technology integration policies

The teaching and learning strategies policy of HEI1 unequivocally stated that the institution subscribed to constructivism, which regards learning as a process of active and participatory knowledge construction. This is supported by Amineh and Asl (2015). According to the aforesaid policy document, *"technology (or cultural tools) and diversity"* are at the heart of the constructivist approach, which fosters autonomous and self-regulated learning, thus, moulding graduates who are endowed with significant skills, as advocated in the literature by, among many others, Fink (2003), Amineh and Asl (2015), Purcell (2022), Faloye and Ajayi (2021) and Ndlovu and Moll

(2016). In addition, the fifth teaching and learning principle of HEI1 proposed to improve the quality of education by promoting the notion of leadership and academic integrity in pedagogy. The above trajectories were also emphasised in other institutional policy documents, notably *Quality Assurance Enhancement*, *Information Centre*; *Intellectual Integrity and Property Rights* and *Distance Education*.

The first principle of the teaching and learning strategies policy of HEI1 placed emphasis on the development of *"new ways of thinking and acting"*, wherein lecturers and students were expected to co-explore curriculum in innovative ways that keep students motivated. Based on the foregoing assertion, one may be persuaded conclude that HEI1 had reneged the role of student motivation to lecturers. However, reviewed literature, notably Purcell (2022) and Faloye and Ajayi (2021), supported the notion that the burden productive educational technology usage squarely lay with the lecturers.

To improve the quality of education, HEI1 pledged to develop innovative teaching and learning practices through actively *"resourcing and capacitating all sites and online contexts [in order] to produce work-ready and socially responsible citizens."* The institution, thus, demonstrated its awareness of the importance of providing technology access by capacitating its campuses in keeping with migration to digital pedagogy environment. This entailed availing *"appropriate and accessible technology."* This awareness also indicated that institutional technology practices can only be effective if issues of equity, accessibility and quality were carefully considered and judiciously incorporated.

To demonstrate its commitment to using technology practices for inculcating quality education and transferable graduate skills, HEI1 indicated its intention to produce students who could fit into the knowledge economy with ease. This would be achieved by equipping academics and students with requisite digital literacy, which would entail the acquisition of knowledge and skills such as: *"ICT usage, media and internet literacy, data analysis and interpretation skills."* To achieve this, and ensure that students productively immersed themselves into the knowledge and skills, the institution integrated them into the mainstream curricula in form of assessable modules or units thereof. The second objective was the incorporation of *"self-directed and lifelong learning skills [which] are nurtured by continuously bridging the gap between theory and practice."* This meant that academics had to teach the following skills:

"*planning, time management, teamwork, innovation and creativity … and creative thinking skills."* Although the policy did not explicitly indicate the use of technology in teaching these skills, there is no doubt that the use of learning management systems and related digital platforms can enhance quality education. The use of relevant software could also help students and academics to solve some problems in significantly shorter time frames.

In its quality assurance enhancement policy, HEI1 took cognisance of several factors such as *"class size and lecturer-student ratio and teaching methods employed in the context of these, lecturers' qualifications, experience, proficiency and development … and [above all] equitable practices."* The aforesaid considerations are not exclusively technology-based, but they have significant impact on resource and support equity, including *"the provision of an appropriate and wide range of learning resources including information centres [and] computer facilities."* The policy further indicated the link between technology equity and access, on one hand, and the resultant quality of education. The policy underscored the need to strike a balance between student populations and the availability of LMSs, *"teaching spaces and physical spaces where individuals or groups of students can work together."* This further buttressed the aforementioned argument, which posited that technology equity, access and the delivery of quality education are intertwined, thus, making it difficult to achieve one in the absence of others.

4.4.2 HEI2 technology integration policies

Various HEI1 policy documents cited educational technology as integral to teaching and learning, quality assurance and assessment, among others, yet it was not an end in itself. These notions were unanimously buttressed in the literature and by the participants. This reality was also palpable in the teaching and learning, and curriculum design policies and plans of HEI2. The institution indicated that it also used technology to foster graduate skills like leadership, scholarship, global citizenship, critical thinking, innovation, and digital and informational literacy. Ultimately, the ideal HEI2 graduate would be a product of a "*teaching and learning ecosystem [that] is structured to help students develop the capacity to [gradually] become independent, self-directed and life-long learners."* This objective resonated with the belief that quality education was a product of course design and technologies.

In its teaching and learning plan and teaching with technology policy, HEI2 undertook to provide high-quality globally recognised education, benchmarked on the best academic principles and practices. The teaching and learning plan clearly demonstrated awareness of historically entrenched inequalities, thus, the institution acknowledged the important of educational technology in national and global socio-economic transformation. Hence, there was need for deliberate production of *"highly skilled and knowledgeable professionals [and] improving the quality of life and opportunities for students, their families and their communities."* This would entail availing *"opportunities [for students] to learn at the frontiers of knowledge, and to hone their critical thinking faculties and moral consciousness in order to meaningfully engage with knowledge."*

The teaching and learning plan proved that HEI2 continually restructured its curriculum to make it relevant to the changing times and learning needs. Hence, the institution's curriculum was responsive to contemporary realities and it was patently supported by the drive to incorporate technology into physical and virtual learning spaces. In light of this, the published sources indicated that HEI2 implemented innovative pedagogy, which was amply supported by the revamped institutional LMS and related resources. The LMS could allow students to submit assessments and, in some instances, receive instant feedback, thus, proving that e-assessments could improve educational experiences by fostering easier conceptual retention and wider participation. This is corroborated by Buzzetto-More and Alade (2006), who argue that timeous marking and feedback improves cognitive processes. For example, the contiguity between assessment and feedback enables students to make conceptual connections with relative ease. Again, the HEI2 teaching and learning plan stressed that prompt feedback can promote quality engagement and intervention planning.

HEI2 had successfully loaded all courses on the institutional LMS, thereby enabling students and academic staff to view their courses, upload and download supporting resources, among other functions. In addition to the LMS, which was being increasingly used for blended pedagogy in the contact cohorts, HEI2 had begun to roll out another e-learning platform, which was already partially operational in one faculty. This platform was the foundation of a nascent distance learning campus. The presence of the two platforms showed clear intentions to support inclusive enrolment and ubiquitous learning, thus, significantly closing the prevailing equity and access

gaps. However, it should be noted that digital integration has inherent demerits. For example, it can spawn new forms of disparities, owing to unequal access due to different levels of barriers (Ertmer *et al*., 2012). Notwithstanding the aforesaid drawback, the availability of digital technology platforms and dedicated technology hubs on campuses has had an edge over traditional pedagogy. For example, the institution's enabled *"students and academics [to] explore and use multiple"* digital resources. Arguably, this development enhanced equitable access to knowledge construction resources of good quality.

4.4.3 HEI3 technology integration policies

The teaching and learning policy of HEI3 was not markedly different from those of HEI1 and HEI2, which were discussed in the previous sections. To begin with, the policy clearly stipulated that teaching and learning should align *"programme purpose, learning outcomes, assessment criteria, learning materials, and pedagogical approaches"* in order to promote scholarship. The policy further specified that the institution was responsible for providing appropriate teaching and learning resources, *"including physical and virtual learning environments, technologies and infrastructure [that support different] modes of delivery from fully face-to-face to fully online."*

Thus, judging from its espoused institutional practices, HEI3 put technology at the centre of teaching and learning and related operations. With regard to acquitting their stakeholder responsibilities, the senate and executive management ably positioned the institution as a key provider of digital infrastructure. This was aligned to the notions in the theoretical framework of the study. In addition to the existing catalogue of pedagogical ICTs, HEI3 also embraced artificial intelligence (AI) and machine learning in the teaching and learning spaces. The institution had already developed guidelines on the applications, limitations and extent of acceptability of AI in academia. This proved that HEI3 was proactive and eager to harness any possible benefits of emerging technologies, while simultaneously, guarding academic integrity.

According to the teaching and learning policy, HEI3 regarded the design and delivery of quality educational programmes as its primary goal. This goal is also contingent on mode of delivery. To demonstrate this alignment, the institutional online learning framework *"focuses specifically on the best practices and strategies for online/distance learning and course delivery"* to complement face-to-face facilitation, workshops, seminars, site visits, excursions and practicals. By placing emphasis on both the

contact and online cohorts, HEI3 acknowledged that productive learning was a consequence of multimodal instruction and manipulation of content. According to reviewed literature, multimodality breaks some learning barriers and ensures epistemic justice for those students who would otherwise have been marginalised due to resource inequality in limited modal instructional contexts (Czerniewicz, 2020; Archer & Newfield, 2014).

The above-stated efforts undertaken by HEI3 showed that the institution genuinely strove to meet its social contract and rights-based obligations. This spirit was also reflected in the teaching and learning of large classes and the ICTs and learning with technology sub-policies, which advocated for the incorporation of technology to *"support creative active learning that makes use of a range of different pedagogies."* The sub-policies complemented the technology integration policy, which declared that ICTs *"should be integrated with authentic learning, thereby supporting the use of technology in the formal classroom and extending flexible learning opportunities into the wider community ..."* The proposal to extend the benefits of ICTs beyond the campus walls was commendable and it aligned with the key goal of the NDP, which states that "advanced information communication technology" can extend learning widely, thus, allowing marginalised groups to recoup missed educational opportunities (NPC, 2012, p. 299).

The ICTs and educational technology policies of HEI3 patently demonstrated responsiveness to authentic global realities and the need to leverage emerging technologies to address pedagogical and societal challenges that stem from inequality.

4.5 Analysing data from open-ended questionnaires

Ten academics took part in the study and all the returned questionnaires were accepted as valid. All the participants acknowledged that technology could potentially improve students' and lecturers' experiences and, consequently, the quality of higher education. Thus, they all viewed technology as more of an enabler than an inhibition to teaching and learning. The participants had varying levels of digital literacy, with three describing their competences as moderate, while seven classified themselves as expert users. Only one participant (HEI3SM) had no lecturing load and his duties were restricted to supervising and managing academics.

All the participants were also aware of the attendant challenges of technology integration in higher education. These challenges included lack of access to devices and the internet, and the fast pace of technological advancement, which negatively affected the shelf life of some applications, devices and related peripherals. Interestingly, all the participants specified the solutions that they and their respective HEIs were implementing to counter the challenges, thus, ensuring that their technology practices addressed issues of equity, access and quality. The participants also recommended some gap closing solutions that could be taken by different stakeholders.

4.5.1 Institutional teaching and learning with technologies policies

As argued in the theoretical framework of the study, institutional technology policies and practices, that is; espoused and enacted technology usage, are intricately linked. Thus, the first open-ended question emanated from the analysis of published sources, so it sought to establish the participants' perceptions of their institutions' stances on technology integration. The question required the participants to describe their institutions' ICT or digital technology usage policies on teaching and learning. The participants' responses to the above question were cited ad verbatim, beginning with the two below:

> *Technology used for teaching and learning has to be approved by the University. Technology must be accessible and available at all times* (HEI3L1).
>
> *The institution encourages the use of LMS for the purpose of reaching out to students, both in class and those unable to attend* (HEI1LS3).

What can be extrapolated from the two responses above is that all instructional activities were supposed to be mediated on the LMSs so that administration staff, academic supervisors and managers would be able to track and monitor teaching and learning related issues. In so doing, targeted interventions to supporting both the lecturer and the student would be implemented. Moreover, institutional practices promote uniformity, thus, curtailing haphazard practices that may compromise the quality of education. Interestingly, although the participants cited above were from HEI3 and HEI1, respectively, their institutional policies were largely similar to the espoused practices of HEI2.

The response below encapsulated HEI1LS1's view of his institution's digital policy pertaining to teaching and learning:

> *ICT in education improves engagement and knowledge retention. When ICT is integrated into lessons, students become more engaged in their work. This is because technology provides different opportunities to make it more fun and enjoyable in terms of teaching the same things in different ways. The digital classroom entirely focuses on teaching via the use of technology. Students use technological or internet-connected gadgets like laptops, tablets etc.*

Although HEI1LS1 did not explicitly describe institutional policy, he delved into the advantages of adopting and implementing technology for teaching and learning purposes. Thus, the response described an ideal scenario in which espoused and enacted digital practices add fun and value to the classroom. However, the participant did not shed light as to whether the depicted scenario reflected the reality within HEI1. This was largely different from the following succinct response:

> *… ICTs can be used for supervision, teaching at Postgrad level. The policy advocates for inclusion of digital technology in teaching and learning* (HEI3L2).

HEI3L2 indicated that his institutional policy unequivocally supported the use of digitally mediated pedagogy, which was further supported by information from one the analysed published sources, which showed that HEI3 ICTs policies were more proactive than those of HEI1 and HEI2. For example, as of 2023, HEI3 already had a comprehensive policy on the use of generative artificial intelligence, while the other two HEIs had none. Further, HEI3L2's response emphasised the role of LMSs in enabling remote supervision of lecturers' practices, and it could as well provide academic managers with information pertaining to lecturers' professional development needs. Thus, LMSs could ideally be used to improve both academics' practices and students' performance.

4.5.2 Institutional communication for promoting digital practices

The second open-ended question probed for the participants' perceptions of the methods that their HEIs used to communicate their ICTs integration policies to academics and other stakeholders in order to entrench desired espoused and enacted digital practices. The participants were asked to indicate the frequency and modes or platforms that their institutions used to actively communicate and promote their digital

technology policies. This entailed describing the efficacy of the existing communication methods and channels. Except for HEI1LS1 and HEI1LS2, all the other participants' responses were partial. For example, HEI2L2 simply indicated that the institution advised academics on digital policy and practice once a week and deemed this frequency as adequate, but without identifying the mode of communication that was used nor providing justification for its sufficiency and effectiveness.

Similarly, HEI3L2's response, *"Somehow effective"* lacked detail and conviction regarding the communication methods that the HEI uses. Similarly, although HEI1LS3's answer: "*The institution encourages daily usage of the LMS"* identified the content of institutional communication on ICTs integration issues. However, it was not enlightening in terms of mode, frequency and effectiveness. This could be attributed to lack of consistency in disseminating and promoting institutional digital policies actively and intentionally. This view was buttressed by HEI1LS1's response, which showed that institutional communication mostly targeted students at the expense of academics:

> *The institution uses [B]lackboard … to actively and effectively communicate with students. Furthermore, communicating with student is done via emails. This communication platform has been effective as students instantly receive information …*

The most comprehensive answer to the question came from HEI1LS2, who pointed out that:

> *The institution uses email, sms, website and learning management system (LMS), teams, social media and posters. The communication channels are effective for all stakeholders because you can access the communication even on your cellphone.*

Although HEI1LS2's response did not indicate the frequency of communication, it shows that the concerned institution, HEI1, used multimedia platforms to reach its stakeholders. All the identified channels, except for posters, utilised digital technology and the target audience could access them ubiquitously. This demonstrated that the institution actively promoted digital technology practices that could enhance access equity and quality issues and, ultimately, student success. This resonated with all the policy intentions of all the HEIs, which specified the inculcation of transferable skills,

including digital literacies, as crucial. In practical terms, as students and academics access their emails, institutional websites and LMSs, they would be simultaneously honing their digital skills and competences. Thus, each online experience doubtlessly involves the manipulation of different technology functionalities. As indicated in the literature, this promotes self and lifelong learning, not to mention various other subtle skills that cannot be obtained in traditional teaching and learning contexts.

4.5.3 How espoused institutional practices foster needful graduate attributes

This subsection was based on the question pertaining to whether HEI policies on teaching and learning with technology were fit for purpose. The participants unanimously pointed out their institutional policies intentionally and practically fostered authentic contemporary skills, including digital literacy. The participants mentioned online engagement, collaboration, creative and critical thinking, communication, inclusion and digital and information literacy as some of the skills that were fostered by the teaching and learning policies of their respective HEIs. UWC (2016) refers to such skills as graduate attributes or simply graduateness.

According to HEI3SM, HEI3 technology policy "*is fit for purpose as we move towards the Fourth Industrial Revolution (4IR)*." HEI2LS specified that the digital integration policy of HEI2 promoted academics' and students' engagement both in word and deed. The ad verbatim citations below detailed the participants' perceptions of whether the espoused technology practices of their institutions fostered relevant graduateness or not. HEI1LS1 indicated that:

> *Technology provides both [lecturers] and students with access to a selection of educational resources that motivate creativity, critical thinking, communication and collaboration. It promotes inclusion and the development of digital literacy skills*.

It is quite clear that HEI1LS1 was well-informed about the role of technology in promoting access to content and shaping a large array of associated behavioural and cognitive skills. Thus, the espoused technology practices of HEI1 had a positive impact on the participant and it can be surmised that his own enacted practices would promote deep and productive learning (Fink, 2003; Ndlovu & Moll, 2016; Purcell, 2022). HEI1LS1's views were echoed by HEI1LS2, who observed that:

> *[The institutional policy] is fit for purpose. One of the 21st century graduate attribute is that they are technology savvy. Students are allowed to have access to institution information and … computer devices. The communication modes allow 2-way communication; students can also communicate back using the same channels*.

Two sub-themes could be drawn from the above citation and these are student capacitation and empowerment, which resonate with the theoretical framework. In the context of this study, the rights-based theory characterises institutions and academics as rights bearers and students as the recipients. By installing relevant digital infrastructure, HEI1 arguably capacitated and empowered both the students and academics, so the respective rights-holders' rights were largely dispensed, thus, promoting technology access and equity and, consequently, high-quality educational outcomes. However, according to HEI1LS3, some inherent challenges within HEI1 needed to be addressed if digital technology were to be regarded as universally empowering. HEI1LS3 bemoaned that some students were largely excluded due to their low digital efficacy and this could result in "*low student success rate specially where honest mistakes are not considered for assessment resubmissions*" (HEI1LS3). This is an important observation and it calls for HEIs and academics to continually identify and close any digital literacy gaps that disadvantage the students.

HEI3L2 concisely depicted the ultimate goal of the teaching and learning with technology policy of HEI3 as follows:

> *It fosters critical thinking and stimulates innovative minds among graduates. Since the university emphasises more on 4IR, the policy is meant to produce graduates who are employable with skills to innovate and transform institutions and societies*.

In the foregoing quotation, HEI3L2 encapsulated the aims of digital technology in the higher education context, notably employability, innovation and social transformation, which are needful in any economy, especially in developing countries like South Africa. Interestingly, the NPC's (2012) National Development Plan cites the goals that HEI3L2 identified as crucial for accomplishing the government's agenda of reversing lingering historical inequalities.

The participants' responses in this section generally mirrored both the literature and the published sources. For example, HEI3L2 connected the role of technology usage in higher education to employability, which tallied with the goals of some institutions that were cited the reviewed literature, notably UWC (2016). HEI1LS3 observed that technology-based teaching, learning and assessment could potentially exclude some students. This view was traversed, albeit fleetingly, in some reviewed literature sources (Buzzetto-More & Alade, 2006; NWU, 2012; UP, n.d.). HEI1LS3 was keenly aware of both the virtues and flaws of digital technology, particularly those that were unique to the assessment submission policy and practices of HEI1. This brings into focus the implications in Moll *et al.* (2022), one of which is that, in spite of its obvious pedagogical benefits, technology cannot entirely replace the practitioner.

On the other hand, it can be surmised that HEI3L2's and HEI1LS3's views were aligned to the social contract and rights-based education theories, given that both participants regarded educational technology as a tool for fostering individual and societal transformation, inclusion and epistemic justice. Achieving these goals through technology would entail promoting digital empowerment or techquity, as coined by Shelton (2021). This can be achieved by availing bespoke digital support to students and academics alike, thereby bringing them to the requisite competence level.

4.5.4 ICTs integration: challenges and mitigations

In this subsection, the researcher presented and analysed the participants' views of the challenges they faced in integrating ICTs into the teaching and learning context. Further, the participants identified the mitigation measures, which they and/or their respective institutions used in order to overcome the given challenges, which included deviant and distractive usage of smart devices by students. For example, one academic bemoaned that some students would log onto social media platforms during lectures. Some of the problems that featured prominently in the participants' discussions were load shedding, low bandwidth, erratic connectivity, lack of LMS portability, rapid proliferation of applications and digital resistance by some lecturers and students. In addition, the potential advantages of digital technology in general, and LMSs in particular, were compromised by lengthy administration processes.

According to HEI3SM, load shedding militated against the use of technology in the teaching and learning spaces in HEI3, therefore, it was imperative to invest in reliable off-grid power supply. The participant further noted that:

> *In some cases, internet connectivity has [been] affected by seacom breakdowns and … bandwidth. My institution has introduced WIFI to mitigate such [mishaps].*

The above response showed that HEI3, in particular, adopted a proactive practice with regard to bridging the capacity gaps that were created by bandwidth and connectivity challenges, thus, enabling students and academics to have uninterrupted access to online resources.

HEI2L1 bemoaned the presence of some encumbrances in the institutional LMS, such as "*the incapacity to be portable with other learning platforms, so one cannot transfer pool questions from another platform*." According to Gillis (2023), portability refers to the capacity of software to be used on multiple devices and operating systems without the necessity of performing major modifications, which would not be cost effective. Therefore, lack of portability can exacerbate access and equity challenges, as it restricts users to specific devices, for instance, institutional desktops that may be found in designated venues only.

HEI1LS3 also expressed frustration with some cumbersome and manual-like functions of the institutional LMS, which overrode the expected advantages that are associated with technology integration in the teaching and learning environment:

> *My major challenge is the capture of student attendance which currently requires manual reading out of student names which is time consuming in a large group. It would be ideal for the LMS to allow QR Code scan or something of that nature.*

The solution offered by HEI1LS3 above is capable of revolutionising the administration and management of the attendance register, as it can present accurate data pertaining to actual attendance time. This can also be effective in curbing tardiness and, above all, prevent administrative routines from taking time allocated for teaching and learning.

HEI1LS1 observed that the inaccessibility of some software, due to high costs, was one of the most pressing challenges for students and this made it difficult for them to complete some tasks, thereby grossly impeding the understanding and acquisition of the relevant concepts and skills, respectively. To compound the software access challenge, HEI1L stated that although HEI1 embarked on digital on-boarding efforts,

lack of digital resources in terms of both quality and quantity, as well as the pervasive connectivity challenges and power outages, the effort was met with minimal success. In the same vein, HEI2L2 noted that "*it is hard [for both academic staff and students] to keep up with*" the flurry of applications that land on the market every day and the best mitigation measure was "not to try to use them all but to select a few one can be comfortable to adapt and adopt." The inherent risks associated with such a proliferation include short shelf life and portability challenges, both of which can increase the cost of technology, thereby constraining accessibility.

Both HEI1LS2 and HEI3L2 expressed concern that, notwithstanding load shedding and the lack of access to the internet and smart devices, some students and academic staff were reluctant to use technology in the teaching and learning process. This challenge can be attributed to what HEI3L2 regards as "*low level digital skills*" and it can be alleviated by instituting "*regular training in ICT for both students and staff*." The institutional policy documents of all the case study HEIs, it was important to maintain continual professional development training and student support in order to promote digital literacy. According to Hohfeld's (1919) rights-based theory, such institutional practices constitute capacity building for empowering the ultimate rights-bearers who, in this context, are students. The downstream merits of capacity building in this case include increased student and lecturer motivation and student success rates, all of which boost the reputation of the relevant institution in terms of producing quality graduates.

The abovementioned challenges, for example lack of LMS flexibility, demonstrate the need to review the efficacy of institutional LMSs on a regular basis and upgrade them by adding relevant affordances and functionalities. In this regard, one of the reviewed institutional published sources showed that HEI2 had revamped its LMS in order to enhance user experience. Regarding load shedding and connectivity challenges, the HEIs should be commended for implementing mitigation measures such as providing standby power generators and access to free Wi-Fi for both staff and students. These mitigations arguably have a positive impact on digital access and equity issues and, eventually, the quality of education.

4.5.5 Stakeholders' roles in promoting technology equity and access

The previous chapters and some subsections of this chapter alluded to some of the roles played by HEIs, executive management, ICTs and academic staff in ensuring

equitable access to digital pedagogy. As noted in the literature (Czerniewicz, 2020; Ramrung *et al*., 2020; Mhlanga *et al*., 2022), the advent of COVID-19 brought a sense of urgency in higher education, which also exposed the futility of the "no-one left behind" mantra, as some students and lecturers found themselves practically "left behind", owing to lack of digital infrastructure and gadgets, as well as their own computer and digital literacy handicaps. Given this background, it can be argued that HEIs have a huge role to play in bridging the technology divide that has, hitherto, been hindering academics and students from fully participating in digitally-mediated pedagogy.

However, in terms of the three case study institutions, the participants' unanimously revealed that their respective management teams were mindful of the digital gap and sought to narrow it by introducing hybrid learning and loaning out digital devices to students for off-campus use, as stated by HEI3SM when describing the role played by HEI3 during and in the aftermath of the rush to transition to online learning:

> *The thrust has been the inclusion of hybrid learning. The move for online learning is gathering pace so the institution is focused on the availability of devices for students both on and off campus*.

According to HEI1LS2, HEI1 by giving students access to specialised software on and off-campus, as well as encouraged the adoption of the bring your own device (BYOD) practice, in order to ease pressure on institutional devices. On the other hand, lecturers had an equally important role to play in motivating students to find relatable authentic value in learning with and through technology, as argued by HEI1LS1:

> *If students can see that the digital tools they are using and the learning objectives they are working towards in class are relevant to their lives, they are more likely to be motivated to develop the skills needed for lifelong learning*.

Judging from HEI1LS1's feedback above, it can be concluded that the participant is cognisant of the importance of using motivational strategies in promoting digital engagement and facilitating the acquisition of related contemporary skills. The response aligns with the teaching and learning policy of HEI1, which unequivocally bequeaths the role of student motivation to lecturers. On its part, as pointed out by HEI1L, HEI1LS1, HEI1LS2 and HEI1LS3, the institution (HEI1) attempted to bridge the access divide by offering hybrid instruction, thus, promoting ubiquitous digital

access and equity. According to HEI1LS1, HEI1 executives were aware that some of their students faced various forms of access challenges, so they established and equipped computer laboratories, an information hub and a cyber-centre, where students can use computers, some of which are installed with special purpose software, to study and complete assessments.

The participants also discussed the roles that various other stakeholders played in supporting the academics' technology practices. These stakeholders included ICTs support staff and information centre/library assistants and external entities. The participants were generally appreciative of the work done by these stakeholders. For example, HEI1LS2 singled out the information centre staff for their role in providing information literacy training to both students and academics. HEI3L1, HEI2L1 and HEI2LS commended the ICTs departments of their respective institutions for setting up devices, troubleshooting related problems and imparting relevant training to academics and students alike. HEI2LS, for example, indicated that both the management and the "*technology and innovation hub centre staff*" of HEI2 were responsible for meeting the training and development needs of the academics and other employees.

Contrary to the foregoing assertion, HEI2L1 further argued that the ICTs department of HEI2 was understaffed, thus, it was so strained that it was largely unable to offer interventions. This is corroborated by HEI2L2, who contended that "*the training is [neither] adequate [nor] effective.*" Therefore, these challenges were likely to have militated against any technology-related efforts that HEI2 might have been implementing. The scenario depicted by HEI2L1 and HEI2L2 proved that some training and development activities that are undertaken in HEIs are simply tokenist. This is also supported by Derting *et al.* (2016), who decry a critical lack of strategic professional development planning and training in most HEIs.

The participants generally thought that external stakeholders played peripheral roles in promoting technology equity and access in their respective HEIs. For example, HEI3SM pointed out that "*external entities*" were not actively involved, "*but [they] sometimes [offered] research grants*." However, HEI2L2 had a different view, as he/she argued that:

> *External stakeholders cooperate with the university as partners to improve digital access and equity through community engagement and service learning*.

The above views pertaining to the involvement of external stakeholders in technology access and equity issues in higher education may be indicative of a dearth of corporate sponsorship. On the other hand, it may also be a result of lack of publicity. In conclusion, while it is commendable that there are some synergies between external stakeholders and HEIs, there is still need for visible and robust corporate investment in technology in the higher education context. From the perspective of the social contract, corporates are duty-bound to contribute to the education and training needs of their communities and nations (Spreen & Vally, 2006; Arshad, 2016).

4.5.6 Interplay between technology and teaching and learning

In this subsection, the researcher presented and analysed the academics' perceptions of the impact of technology on pedagogy and the quality of education in the case study higher education institutions. The participants unanimously agreed that technology added value to pedagogical practices, as it allowed for ease of content sharing, self-paced student-centred learning, ubiquitous access to course material and immersive engagement. All these attributes can immensely lessen lecturer fatigue and yield high-quality learning outcomes, as explained by HEI2LS in the citation below:

> *Digital technology facilitates teaching and learning through videos, digital citizenship, software tools, games, collaboration while traditional pedagogical methods are teacher-centred in nature*.

The above quotation rehashed the fact that technology frees academics from the burden of repetitive routines and places the students at the centre of the knowledge construction process, unlike in the traditional classroom set up. Thus, in this citation HEI2LS showed that technology usage can promote significant learning, whereas old-style pedagogy was characterised by surface learning, which fostered memorisation rather than understanding (Fink, 2003). In the citation below, HEI1LS1 presented a more comprehensive account of the benefits of technology-mediated teaching and learning:

> *… digital learning allows for a more personalised learning experience, as students can choose the content and resources that best suit their learning styles and needs. This can lead to better learning outcomes and actually increase student engagement. Technology in education enables [students] to adjust to their own pace of learning. Students who need extra time can spend*

> *more time going over exercises until they understand, while students who need less support can continue ahead. It also frees up the [lecturer] to help [students] who need more support on an individual level.*

In the foregoing citation, HEI1LS1 pinpointed multiple benefits that accrue from technology-based learning, notably personalised learning, which also fosters independent or autonomous learning. The participant also cited increased student engagement and opportunities for students with different challenges to receive targeted attention from the lecturer. All these advantages demonstrate how the use of technology in teaching and learning spaces has an edge over traditional methods, which make it difficult for students, especially in large classes, to breakdown and explore concepts at their own pace, or receive individual coaching from the lecturer. For example, in a well-equipped computer laboratory, students can personally and collaboratively engage with online content at their own paces. In addition, online content is largely multimodal, thereby enhancing the rate at which students grasp concepts. HEI2L2 provided emphatic proof of the efficacy of technology-mediated teaching and learning by vouching thus: "*We are seeing scenarios where students who do not physically attend classes [are] passing with distinctions*."

However, in the quotations below called for caution in the use of online resources and virtual engagement, as injudicious usage may lead to unintended results. In other words, increased digital access and equity in the learning environment can result in decreased student success or poor outcomes if the lecturer is not at hand to provide needful guidance. These sentiments were well-captured in HEI1LS2's observation below:

> *[Unguided digital learning may be conducive] for adult learning, where students take full responsibility of their studies. It also depends on the type of the module. For example, practical modules [are] better taught [using] traditional methods. [It is a] no [for] young adults, as they require more guidance and follow-up to compete required material*.

In concurrence with the above excerpt, HEI1LS3 added that the application of digital technology in pedagogy should be governed by the prevailing context namely: the calibre of students and the nature of the subject matter or module. This brings to mind Alfieri *et al*. (2011) and Pinto and Leite's (2020) in the reviewed literature, who advise that the use of technology in the classroom should not be a solo forage into the digital

jungle, where each student is left to his/her own devices. Therefore, lecturers must not renege their facilitatory roles on the presumption that their students have online resources at their disposal, which on its own does not translate to immersive engagement. This was summed up in the excerpt below:

> *[Technology usage improves pedagogical experiences], provided it [is not] implemented independently from contact sessions, [e]specially for the type of students we get in our institution, contact sessions are vital, [particularly] for [the] software development [module]* (HEI1LS3).

All in all, while all the above-cited participants agreed that technology integration offered numerous benefits to the teaching and learning space, some were able to critically evaluate its downsides as well. HEI2L2 and HEI3L2 posited that pedagogical technology had the potential to reduce the necessity of physical class attendance for mature and gifted students, thus, fostering personalised and self-paced learning. HEI1LS3 concurred, but she saw complete abandonment of contact classes as a pitfall, given that some student cohorts needed closer guidance than others to navigate through their courses, as the online environment could be a confusing maze for them.

HEI1LS2 and HEI1LS3, who were both from the same institution, noted that it was impractical to teach and learn some courses entirely online. Although the question in this context was not crafted to elicit for comparison between online and contact learning, it seemed inevitable for the participants to evaluate the effectiveness of ICTs integration without drawing parallels between the two contexts. It should be noted, however, that adopting technology does not equate to an automatic abandonment of traditional pedagogy. Some of the above-cited responses betrayed some practitioner's espoused practices, which apparently conflate the concept of technology integration with online distance learning. This belief may result in some academics being so self-conscious about their digital proficiency that they defensively avoid using digital platforms and tools in their practices. In the reviewed literature, Ertmer *et al.* (2012) refer to this phenomenon as a second order barrier to classroom technology practices.

4.5.7 Practices for promoting productive digital technology usage

The participants' perceptions of their own and their institutions technology practices were critiqued in this subsection. Ideally, pedagogical technology practices promote

meaningful knowledge construction and address equity and access challenges that may hinder the attainment of quality education. This subsection was based on responses to three different sets of questions, which all sought to establish each of the ten participant's idiosyncratic digital technology practices, in relation to those of their respective HEIs.

Except for HEI3L1 and HEIP1, who simply stated their purposes for technology usage as "*online assessment*" and "*student-student [and] lecturer-student interaction*", respectively, the other participants provided fairly comprehensive feedback. For example, HEI1LS2 indicated that she used the LMS and other digital platforms as both media for lecturer-student communication and for creating stimulating learning activities that keep students meaningfully engaged. This view echoes the motivational factors and productive usage goals of technology, as mentioned in the teaching and learning policy of HEI1 and the reviewed literature, particularly Moll *et al.* (2022) and Ertmer *et al.* (2012). These authors argue that educational technology should foster student-centred learning, rather than stifle it.

The three citations below revealed the various strategies that the academics adopted when using technology platforms for instructional purposes. The excerpts also alluded to some of the merits of teaching with technology. These benefits culminate in student empowerment and, consequently, better quality educational outcomes. HEI2LS, for example, used a variety of innovative digital-based methods which, as shown in the excerpt below, incorporated multimodal strategies that foster inclusivity, given that students have diverse needs, interests and capabilities. HEI2LS stated thus:

> *[I] use … websites, videos, games, discussion forums, [and] PowerPoint presentation. … Learning Management Systems [make] assignment submission [less complex]*.

The above was echoed by HEI1LS1, who added that he incorporated problem-based learning to ensure that digital skills and course concepts were applied to authentic context, as presented in the following citation:

> *[I use] different [strategies] in class – videos, discussions, lecture, groups, guest speakers, [and] pair-work. [I also make] use of different assignment methods – written, oral, projects, etc. – so as to engage as many ways of learning as*

possible (e.g., visual, auditory) [by asking] students [to solve] real-world problems that [have] multiple solutions.

In the quotation below, HEI1LS3 revealed that she used educational technology, in this instance, the institutional LMS, to share resources with the students and promote collaboration. In addition, the academic used the platform to perform supervisory and administrative tasks, thereby keeping herself informed on areas that called for intervention. Such actions maximise student success rates. HEI1LS3 summed up her promotive digital practices as follows:

I try by all means to make [the] most of all capabilities that support my goal as a lecturer and as a programme coordinator, from sharing resources/content, using the retention centre to monitor at risk students, using discussions and announcements, etc.

In all the above citations, the participants demonstrated immense knowledge of the practical importance of incorporating multimodality into instructional design. All the academics were also conscious of the need to cater for differentiated abilities, thus, embracing diversity. Using multiple techniques may seem to be time-consuming and complex, but it definitely motivates all students to engage with the content in a particular lesson or course. This echoes the imperative in the teaching and learning policy document of HEI, which stresses that the lecturer plays a central role in making learning with technology interesting and worthwhile. HEI1LS3 brought to the fore the other functions of LMSs that transcend lecturer-student and student-student interaction. The academic revealed how some LMS functions can be deployed to detect at-risk behaviour and inform decisions on improving practice.

As discussed in the literature, academics' technology adoption and usage patterns are generally shaped by their beliefs and digital proficiency levels (Ertmer *et al*., 2012). In the above citations, HEI2LS, HEI1LS1 and HEI1LS3 demonstrated that they had advanced digital skills levels and could use numerous LMS functions to promote significant learning. For example, HEI2LS described his digital competence as good and that he was open to engaging in lifelong learning, in order to familiarise with emergent applications and tools.

However, HEI1LS1 emphatically stated that he had a "*high level set of skills, knowledge and attitudes"* that enabled engage in *"critical use of technologies and*

systems …" In like manner, HEI3L1, HEI3SM, HEI1L and HEIP3, described their knowledge and practice of pedagogical technology as proficient. HEI1L indicated that he had a certificate in Blackboard, while HEI1LS2 had a strong academic background in the ICTs discipline.

Although, HEI2L1, HEI2L2 and HEI3L2 described their proficiency levels as average to moderate, they were not entirely clueless with regard to the basic functions of their institutional LMSs. Above all, long-serving academics with PhDs, they were well-versed in generic pedagogical theory, such that their digital skills levels did not impede with quality teaching. In addition, HEI2L1 and HEI2L2 specified that they frequently used educational technology and, given time and experience, their competences would doubtlessly improve. This justifies the need for HEIs to offer tailored professional development training on continual bases to both senior and novice academics, as they have different professional development needs. This is advocated by the NPC (2012) and Derting *et al*. (2016), as cited earlier in this chapter and in the reviewed literature, respectively. Interestingly, the differences in proficiency levels seem to be determined by age, given that the younger academics (digital natives) generally described themselves as highly trained, while the older generation (digital immigrants) (Ch'ng, 2019), save for HEI3L1, viewed their digital literacy skills as more or less emergent.

In terms of how HEIs tailor-make their enacted practices to address some digital equity and access challenges, the participants generally revealed that their HEIs made commendable efforts in closing the digital access and equity gaps. For example, cognisant of the fact that some students did not have basic digital devices, such as tablets, laptops and desktops, all the case study HEIs were said to have designated computer or cyber-centres, which were all well-equipped.

In addition, the HEIs were gradually embracing blended and hybrid learning modes, as stated by HEI1LS3:

> *Our institution is not strictly online, so students with connectivity issues are able to attend on campus and to use resources provided for them for accessibility purposes. Students [who are] unable to attend class daily also get to know what was covered in class and not miss out on any content or work*.

HEI2L2 echoed the above assertion by stating that the hybrid and blended learning formats were inclusive strategies, which were designed to suit students from all backgrounds, given that those who lacked either digital competences or devices could find support on campus. On the other hand, HEI2LS indicated that HEI2 incorporated the "*communities of practice*" strategy to empower academics with low digital efficacy. This entailed the creation of a platform where academics shared knowledge and experiences with their peers. These practices are in tandem with the evidence from the analysed published sources, as well as the literature, which specifically referred to the need for institutions to empower the digital *have-nots* (Foley *et al.*, 2022; Ch'ng, 2019; Ertmer *et al*., 2012).

In academia, supervision and monitoring ensure compliance with the quality standards. In institutions that use LMSs, these processes entail checking the grade and retention centres, as well as the discussion forums. In so doing, supervisors and managers can pull out data-centred reports, which can be used to devise any needful intervention strategies. With regard to this, all participants argued that the supervision and monitoring should start with lecturer and student empowerment and capacitation with digital skills and devices, as well as power back-up solutions. HEI1LS2 declared that academics must receive systematic training on using institutional systems that are relevant to their respective key performance areas. This was echoed by HEI2L2, who stated that:

> *Besides more professional development and training, there [is] need [for] full blown courses … on how digital technology can be used for teaching and learning.*

HEI1LS3 mentioned that academic supervisors should be allowed "*more [access to] functionalities without need for admin rights*" so that they can be able to provide unlimited support to both academics and students. Thus, the participants unanimously felt that quality assurance strategies could only succeed if both the academics and students were well-appraised of their roles.

4.6 Summary

This chapter comprised two main sections. In the first section, the researcher analysed data from institutional policy documents pertaining to teaching with technology and curriculum quality. The second section was based on analysis of data from an open-

ended questionnaire, which consisted of 21 questions, which were divided into four categories namely:

- participants' biographical information,
- interrogation of academics' perceptions of the technology policies of their respective HEIs,
- analysis of lecturers' practices, and understanding of the interplay between espoused and institutional policies, and
- the envisaged technology integration framework.

The first section analysed data that were derived from a number of institutional policy documents that spoke to teaching and learning with technology, quality assurance, curriculum design and assessment. The policies of all the three institutions clearly recognised the importance of incorporating technology into the teaching and learning spaces, in order to support different instructional strategies. HEI1 particularly stressed that the success of technology integration at classroom level largely depended on the lecturers' digital competence levels and their ability to motivate the students. While all the policy documents of the case study HEIs regarded technology as an empowering tool for both academics and students, only HEI3 unequivocally proclaimed that it was primarily responsible for sourcing the requisite digital infrastructure.

In the second section, the participants unanimously agreed that technology played an important role in improving the quality of teaching and learning. However, they were also cognisant of the challenges that could militate against that goal – for example, lack of technology efficacy among staff and students, lack of devices and software, and the pervasive power outages. The academics acknowledged the importance of supervision and monitoring, but they decried lack of transparency in terms of the nature of the process. Consequently, the participants generally opined that technology practices can be effective if staff and students were adequately supported and developed with regard to institutional digital platforms. This brought into focus the need for clinical supervision and bespoke training and development programmes, as also argued in the literature (Derting *et al*., 2016). To a large extent, the findings in the two main sections of the chapter were complementary, thus, showing the merits of triangulating data sources.

The results of the study were summarised and discussed in the next chapter. The chapter also provided the conclusion and recommendations, based on the literature, theoretical foundations and the findings of the study.

Chapter 5: Discussion, conclusion and recommendations

5.0 Introduction

Overall, the findings of the study resonated with the findings in the literature. The study found that although the HEIs and the academics were diligently trying to overcome different barriers to digital equity, access and quality, it was not too easy to bridge the digital gap due to the proliferation of new digital trends in the form of applications and tools. It was found that this had some cost implications related to the procurement of new applications, tools and devices as well as conducting training and development programmes to upgrade user skills. The budgetary constraints and other challenges hindered optimal roll-out of technology projects, thus, making access and equity targets fluid and difficult to achieve. The last section of this chapter presented evidence-based conclusions and recommendations, as well as identified and discussed the limitations of the study. In addition, the chapter discussed the limitations of this study and presented directions for future studies. Although the study found that in some cases there was congruence between academics' espoused and enacted technology practices, it could not conclusively establish that the relationship was linear and mutually influential and this could form the basis of future studies.

5.1 Overview of the key findings of the study

5.1.1 Findings from published sources

Data from the technology integration, assessment, quality assurance and other related institutional policies generally showed that all the three case study institutions were actively migrating to digital technology-driven practices. These measures were intended to improve teaching and learning experiences and, ultimately, the quality of higher education. All the institutional policies of the sampled HEIs reflected acute awareness of the historical injustices and class inequalities that still bedevil South Africa. Thus, all the published institutional sources that were analysed pledged to redress the skewed state of higher education by, among other means, using technology to increase access and participation.

All the institutional documents referred to digital technology as an enabling tool for rolling out online distance and virtual learning, thus, breaking into non-traditional spaces and increasing ubiquitous access to higher education. This meant that

previously disadvantaged population groups would be afforded equitable access to formerly ring-fenced higher education opportunities. In addition, all the three HEIs acknowledged their social contract obligations in terms of taking responsibility for investing in digital infrastructure, software and devices. In this case, all the institutions' policies significantly addressed issues of educational access, equity and quality. These acknowledgements and efforts were truly reflective of the concepts of rights, social contract, equity and epistemic justice, whereon the theoretical and framework of the study were premised.

The various policies of all the case study HEIs patently specified that technology integration was at the heart of their efforts to inculcate lifelong learning, innovation, entrepreneurship, critical thinking, digital and information literacy and collaborative skills. The policies also acknowledged that the lecturer had a prominent role in driving digital equity and access and, consequently, the quality of higher education. This was emphatically stated in the teaching and learning policy statement of HEI1, and implied in the published sources of the other two HEIs. However, all the HEIs had sound policies that focused on technology related training and development for all users, including lecturers and students.

5.1.2 Findings from the open-ended questionnaire responses

Although the generational gap issue was not thoroughly pursued in this study, it portended variegated espoused and enacted practices, owing to the experiential-based beliefs of the academics. All the six participants from the two public universities had doctoral qualifications, while three four from the PHEI had honours degrees, while only one (HEI1LS3) who had a postgraduate diploma. Five of the participants namely: HEI1LS3, HEI2LS, HEI2L2, HEI3SM and HEI3L1 had qualifications in the STEM stream, specifically the ICTs category. All the participants, with the exception of HEI3SM had lecturing duties, with four (HEI2LS1, HEI1LS2, HEI1LS3 and HEI2LS) having additional administrative roles as programme coordinators/managers.

Below is a synthesis of the participants' responses to the open-ended questions, which were compacted into four broad themes:

Theme 1

Institutional technology integration policies

The set of questions that constituted this theme sought to establish the academics' views and understanding of the teaching and learning with technology policies of their respective HEIs. Based on the given descriptions, the participants' understanding of their respective institutional policies ranged from unsatisfactory to comprehensive. Six participants (HEI1LS1, HEI1LS2, HEI1LS3, HEI2L1, HEI2L2 and HEI3SM) gave detailed descriptions that captured the rationale of the ICTs integration policies, that is; to promote inclusive pedagogy which caters for differently-circumstanced students. The prevalence of unsatisfactory responses may be indicative of the fact that lecturers neither knew about, nor understood, their institutional policies and this can be changed by adopting consistent and intentional communication practices, as well as well-designed professional training and development routines.

Theme 2

Stakeholders' roles in promoting technology practices

This theme was based on three questions, the first of which required the participants to comment on the roles of different stakeholders in promoting viable technology practices. The second question sought to establish how the HEIs managed and disseminated information pertaining to institutional ICTs policies and other related issues. Thirdly, the participants were also required to discuss how the ICTs integration polices, themselves, fostered overall graduateness.

With regard to the first question, the participants unanimously pointed out that they, as academics, were well-aware of their roles in bridging the digital divide. All the participants stated that their HEIs were generally supportive and they knew their social contract roles in terms of providing digital infrastructure and resourcing digital hubs and information centres with computers and software. Pertaining to the roles of ICTs and information centre/library staff, all the participants stipulated that, although support staff discharged their duties professionally, they were generally overwhelmed, owing to short-staffing in the respective departments. Three participants noted that although their institutional ICTs policies were sound, the quality of training and development programmes was not a match. Save for one participant (HEI2L2), the other nine indicated that there was a dearth of corporate stakeholder support for higher education technology roll out.

On the third question, there were some misgivings about lack of robust communication structures in HEI1, which is a PHEI. Two participants, HEI2L1 and HEI2L2, who are both from HEI2, categorically stated that such communication was infrequent and ineffective. This view was supported by HEI1LS1, who bemoaned that institutional management communicated more frequently with students than with teaching staff on issues related to technology policy and practice. However, HEI2LS, HEI3L1, HEI3L2 and HEI3SM, who were all from the two state universities, were generally satisfied that their institutional communication methods were supportive of their technology integration visions.

Theme 3

Technology integration challenges and mitigations

This theme was based on the technology integration challenges and respective interventions that were identified by the participants. The key challenges included power outages, erratic connectivity, LMS limitations (such as cumbersome manual data capture), lack of portability and short shelf life applications. In addition, some students had limited or absolutely no access to either the internet or smart devices off-campus. This challenge was compounded by a streak of digital phobia and illiteracy among some lecturers and students. The solutions to these challenges were discussed in the recommendations section.

Theme 4

Technology integration and productive usage

This theme was premised on the academics' perceptions of the impact of pedagogical technology on student success and the quality of higher education. None of the participants had any reservations about the positive role played by digital-driven practices, especially with regard to automating some tasks that academics, students and administrators used to complete manually. Thus, technology integration reduces fatigue and burnout, as managers, supervisors and lecturers can share content, assessments, feedback and alerts with different groups of the same cohort in one instance, rather than repeatedly create them.

Technology-driven pedagogy also promotes ubiquitous access, thus, ensuring that students can engage in synchronous remote learning or asynchronously catch up on some lessons or discussions. In addition, technology enables immersive and personalised learning at students' own time and pace. However, the participants were generally aware of resultant pitfalls, such as the tendency by some students to drift to social media or entertainment platforms. According to some of the participants, such behaviour could be countered by applying creative content and instructional designs, which leverage on immersive affordances that bring fun to the digital learning space. This is in sync with one of the injunctions in the teaching and learning policy of HEI1.

5.2 Discussion of findings

5.2.1 Technology integration in HEIs and its impact on equity, access and quality

Data from both the published sources and the academics showed the state of technology integration into the processes of teaching, learning and administration in the case study HEIs as satisfactory, in spite of the form and volume of the challenges that continually changed. For example, both software and devices need constant upgrading in order to accommodate emergent developments in technology and educational goals. All the three HEIs have digital infrastructure and designated computer and information centres that are manned and maintained by specialist staff. This demonstrated the existence of structured management who are dedicated to assisting academics and students, thus, minimising access and equity barriers.

According to the literature and findings of the study, the most common types of technologies used in South African HEIs are LMSs, computer devices, fixed WI-FI routers and the internet. All the case study HEIs, as the findings revealed, had these basic technologies, although there was generally limited access to computer devices, thereby compelling some students to bring their own devices, such as mobile phones, tablets and laptops to campuses. This further exposed a lingering access and equity gap that would require the state, policy makers and HEIs to adopt an inclusive outlook in terms of capacitating institutions with needful digital infrastructure and tools, given that some students do not own digital devices.

From the point of view of Hohfeld's (1919) rights-based theory, the aforestated stakeholders, including corporate entities, are characterised as the rights or duty bearers. Consequently, in this case, the expectation is that the former dispense the

rights to equitable access to quality education to the students, who are the rights holders. According to the literature (Mhlanga, Denhere & Moloi, 2022) and the participants, the efforts that were being made by the rights or duty bearers, who also include academics, were commendable, but the students, as the rights holders, were generally not receiving what was rightfully theirs as a result of lack of digital devices, tools and connectivity. This brings into focus Meehan's (2015) view that digital technology is supposed to be deployed for the sole purpose of improving livelihoods.

By implication, the humanist and epistemic justice point of view, if access to quality education is unequal, owing to inequitable distribution of enabling technology, then higher education in South Africa can still be regarded as a privilege for the elite, rather than a universal right. The fact that some students from disadvantaged backgrounds do not have personal computers or off-campus access to the internet, due to lack of data or erratic power supply, means that duty bearers are reneging on their social contract obligations, as stipulated in the literature by, among many others, Fieser and Dowden (n.d.) and Arshad (2016).

Notwithstanding the existence of the aforesaid gaps and related challenges in the efforts of the state, HEIs and academics to deploy technology for the purpose of improving equitable access to quality higher education, the gains brought about by digital on-boarding are not negligible. For example, the post-COVID-19 era saw many contact HEIs introducing online distance tuition, over and above increasing the use of open educational resources (OERs) and different forms of blended learning.

Without digital technology ERT would not have been possible and both basic and higher education would have totally collapsed. This is supported by both the literature (Czerniewicz, 2020; Purcell, 2022; Mhlanga *et al*., 2022) and the findings of the study. In this regard, increased online learning enrolment reduces access inequalities and increases the quantum of participation in higher education to unprecedented levels. Without doubt, technology has had a positive impact and brought higher education opportunities to formerly marginalised demographic groups and, at the same time, enhanced the quality of teaching and learning.

In spite of the aforementioned success factors associated with technology integration, techquity cannot be achieved overnight, as South Africa is still bedevilled by macro-economic challenges and inherent inequalities. National challenges inevitably have a negative impact on the operations of the HEIs, thus, equitable deployment of

technological resources is not feasible. Instead, the current digital gap can only be narrowed by incorporating both the letter and the spirit of the social contract and rights-based theories into technology policies and practices. The aforementioned theories inform the theoretical and framework of this study, which posit that the state and the HEIs are duty-bound to provide digital infrastructure, devices, software and internet connection to ensure a seamless transition to the adoption of technology-mediated pedagogy. Although parents, guardians and corporate funders can also provide digital devices and foot the cost of data, they cannot achieve much in bridging the digital divide in higher education without state and HEIs investment in digital infrastructure, LMSs and software licencing.

However, while the notion of wholesale digitalisation is commendable, there is need to be cautious about making it the sole goal worth pursuing, as doing so may yield unintended results. For example, injudicious and unethical use of online resources definitely dent academic integrity and scholarship in general, thus, deflating the quality of education. This caution is encapsulated in the words of a global educational technology expert, Neelam Parmar:

> It is extremely important to understand that learning is served and not defined by technological tools, [but they] will [not] fix … teaching and learning problems … but it is … important to [have it] embedded firmly and seamlessly within the curriculum and lesson delivery in the classroom (ADvTECH, 2024, n.p.).

The corollary is that, if done without proper strategic planning, the pursuit for technology access and equity can itself militate against the pursuit of quality education. Therefore, only well-thought out technology integration policies and practices can promote equitable access to high-quality higher education.

5.3 Limitations of the study and suggestions for future studies

The methodology of the study was qualitative and this entailed the use of self-reported data, which was prone to bias (Rosenman, Tennekoon & Hill, 2011). Thus, the results of this study are neither generalisable to the entire higher education landscape in South Africa, nor to the experiences of all the academics from the case study institutions. One other limitation that emanated from the research design was that the open-ended section of the questionnaire required detailed responses, but some

participants' responses to one particular question were rather scant, thus, leaving it barely answered. Although this limitation was countermanded by data triangulation, in this case, analysis of published sources, it reflected the need for future studies to interrogate how institutions operationalise key policies, especially those that inform the integration of technology into teaching, learning and assessment, among other key academic performance areas. Future studies can also explore the ethical risks associated with digital content, as well as students' perceptions of technology-driven learning.

5.4 Conclusion

The aim of this study was to establish how the technology practices of higher education institutions and academics promoted issues related to educational access, equity and quality. To a large extent, this goal was achieved. First, the study found that all the published sources clearly articulated how each institution was implementing digital integration as a tool for improving teaching, learning, assessment and organisational communication and administration. Except for the unsatisfactory display of the content of institutional policies by most of the participants, the researcher was generally satisfied with their knowledge of their roles as the drivers of educational transformation through judicious use of technology tools. All the participants were quite conscious of their digital efficacy, as well as their professional training and development needs.

The theoretical framework largely provided the researcher with a practical template for interpreting and analysing data. An understanding of the interplay between the rights-based and social contract theories enabled the researcher to understand higher education as a basic right and not just a privilege. Consequently, all stakeholders, notably lecturers, institutional management, the state and external entities, should altruistically play their roles in the delivery of quality higher education by fostering equitable access through the use of technology.

The research question sought to establish how the technology practices of South African HEIs and academics promoted equity, access and quality. The findings of the study showed that both academics and their respective HEIs viewed technology as an enabling tool, but it needed to be used with full awareness of the intervening risks and challenges, if the objectives of teaching and learning were to be realised.

5.5 Recommendations

The recommendations provided in this section are based on the findings of the study. Institutional executives, instructional designers, academics, support staff and relevant external entities, such as businesses that wish to extend their corporate social responsibility investment to higher education may find the following valuable:

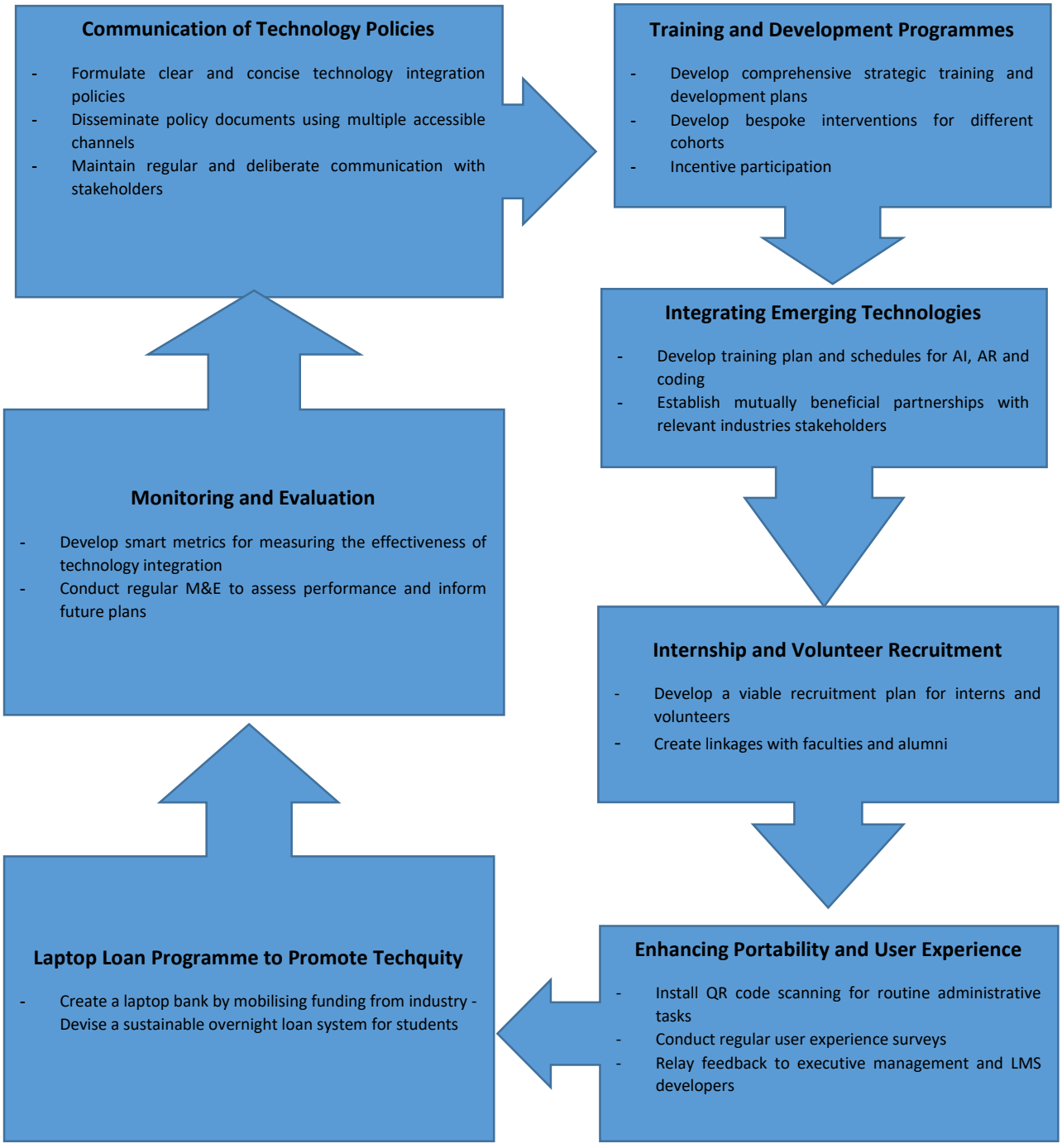
- HEIs executives need to ensure that their institutions have deliberate and sustainable technology integration policies and practices, which should also be effectively disseminated to academics, students and IT support staff. Although all the participants indicated that they were aware of their respective institutions' digital technology usage policies, a few expressed reservations about the modes and frequency with which these were communicated to other stakeholders, notably lecturers.
- In order to improve academics' digital efficacy and knowledge of new applications, institutional management should dispense training and development programmes that are strategic rather than haphazard and generic. This sentiment was highlighted in the literature, as well as voiced by some of the participants, who felt that some IT-integration workshops were misaligned to their professional development needs.
- None of the participants mentioned that he/she incorporated AI, augmented reality (AR) and digital simulation in his/her practice nor coded their own. As a result, there is an urgent need for teaching and learning managers in all HEIs to include courses related to these concepts in staff development programmes across faculties.
- Recruiting interns and volunteers can assist institutions to mitigate the staff shortages in the ICT support departments, as pointed out by two participants namely: HEI2L1 and HEI2L2. Therefore, it is crucial for institutional executives to institute relevant policies and practices to guide the process in practically sustainable ways.
- Improving portability and installing QR code scanning affordances can minimise the need to use the same computer device and time spent on administrative tasks such as marking the attendance register and capturing of assessment marks, respectively. This observation was made by HEI1LS3, a lecturer who doubled as

a teaching and learning supervisor. Therefore, institutional executives, technology directorates and/or LMS developers must continually conduct user experience surveys and devise corrective measures, where necessary.

- The HEIs technology directorates should devise and operationalise a scheme for loaning laptops to needy students on overnight bases. Alternatively, the government and corporate funders can create a fund for capacitating HEIs and students with relevant technology on an equitable basis. According to HEI3SM, such a scheme can bridge the digital access divide, thereby improving equitability and epistemic justice, which also resonates with Erdmann's (2021) definition of equity, as well as the illustrations in Figures 1 and 2 in the literature review chapter.

The integrated technology framework (Figure 9), which is shown on the next page, embedded the foregoing recommendations. By adopting this framework, HEIs can foster effective technology adoption patterns, and enhance digital efficacy among academics and students, thereby fostering equity, access and quality.

Figure 9: Integrated technology adoption framework



5.6 Suggestions for future studies

The review of related literature and the findings of the study provided important observations into how institutional and academics' technology practices can foster equity, access, and quality in the South African higher education context. However, these insights were not exhaustive, so it is essential for further research to be conducted to deepen stakeholders' understandings of the aforesaid issues. Further studies can be conducted to explore the adoption and impact of emerging technologies such as virtual reality (VR), augmented reality (AR) and artificial intelligence (AI), particularly large language models (generative AI), on the quality of higher education outcomes. This could yield valuable insights into the nature and trajectory of future trends in higher education teaching and learning. In addition, **a mixed methods** interdisciplinary **study** may shed more light on the practice **pattern**s, perceptions and experiences of academics and students in leveraging technology to enhance equity, access and overall quality in South African higher education.

5.7 Summary

In this chapter, the researcher applied the theoretical framework to summarise and discuss the results of the study, as well as suggest recommendations that various stakeholders can adopt in order to improve technology policy and practice. This contributed to a broad understanding of the nexus between technology practices and the quality of education in the South African higher education landscape. In the same vein, the chapter intended to caution and inform stakeholders, who are craft related technology integration policies and those who put them into practice, to be aware of the inherent opportunities and pitfalls of technology integration. The researcher made some evidenced-based suggestions for future studies, before providing a diagrammatic visualisation of the integrated technology adoption framework.

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7.0 Appendices

Appendix A: Questionnaire

Research Questionnaire

My name is Rodwell Chindomu. I am a final year Masters of Education student at the University of Witwatersrand. In partial fulfilment of the requirements of the qualification, I am conducting a study titled *Technology to promote equity, access, and quality in higher education: a case of four institutions.* I, therefore, kindly request you to participate in this study by answering the questions below. This will require about 60 minutes of your time. The information that you will provide here will be treated as strictly confidential and will be used only for purposes of this study.

Thank in advance for sparing time to complete the questionnaire.

SECTION A: Biographical Data

Tick the appropriate option

Gender	Female	Male	Other
Responsibilities	Lecturing	Lecturing and Supervising Academics	Supervising/Managing Academics Only
Lecturing Experience	0 – 3 Years	4 – 7 Years	8+ Years
Highest Educational Qualification	First Degree	Postgraduate Diploma OR Master's Degree	Doctor of Philosophy (PhD)
Area of Specialisation	STEM	Humanities, Arts and Languages	Economic and Business Sciences

Section B: HEIs' policies for promoting digital access and equity, and educational quality

1. Briefly describe your institution's ICT or digital technology usage policy with regard to teaching and learning.

2. Indicate the frequency and modes/platforms that the institution uses, if at all, to actively communicate and promote the policy to stakeholders, such as academics. Would you regard the communication as effective and adequate?

3. Overall, is the policy fit for purpose in terms of yielding 21st century graduate attributes and meeting the institution's mission and vision?

4. What challenges, if any, do you encounter in implementing the ICT usage policy in the classroom? What mitigations do you and the institution implement to overcome the identified challenges?

Section C: Espoused and enacted technology practices

5. To what extent does the availability of digital technology devices, software and internet connectivity for on and off-campus engagement match the policy?

6. How do the following stakeholders support the institution's ICT policy in terms of promoting digital access and equity for teaching and learning purposes?

   a) Management (including Teaching and Learning Supervisors/Coordinators)

   b) ICT Support Staff

   c) Information Centre/Library Staff

d) Technology and Innovation Hubs/Centres Staff (where applicable)

e) External stakeholders such as corporate entities and government departments

7. Do you believe that digital technology results in more effective teaching and learning experiences than traditional pedagogical methods? Provide reasons for your opinion.

8. What strategies do you employ to ensure that digital technology usage is not just any other mediatory platform or repository?

9. Describe your digital competency/efficacy level.

10. How conversant are you with your institutional learning management system (LMS)?

11. Describe the frequency and purposes for which you use the institutional LMS.

12. Apart from the institutional LMS, which other digital platforms or tools do you use for pedagogical purposes? If you do, what is your motivation for using them?

13. How do you cater for challenges related to digital equity and access and delivering quality education/promoting inclusion?

Section C: Envisaged technology practice framework

14. Considering some of the challenges that you identified above, suggest how HEIs can tackle them in order to ensure that academics comply to technology usage policies.

Thank you for participating in this study – your contributions are valued and appreciated.

Appendix B: Ethics training certificates



Zertifikat
Certificat
Certificado
Certificate

TRREE

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that

Rodwell Chindomu

a complété avec succès - has successfully completed

Introduction to Research Ethics

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Clinical Trials Centre
The University of Hong Kong

Release Date: 2023/02/04

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator

APPROVED BY
SIWF FMH
ISFM

Foederatio Pharmaceutica Helvetiae
FPH
Programmes de formation postgraduée et continue

Ce programme est soutenu par - This program is supported by :



Zertifikat
Certificat
Certificado
Certificate

TRREE

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that

Rodwell Chindomu

a complété avec succès - has successfully completed

Research Ethics Evaluation

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Clinical Trials Centre
The University of Hong Kong

Release Date: 2023/02/07

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator

APPROVED BY
SIWF FMH
ISFM

Foederatio Pharmaceutica Helvetiae
FPH
Programmes de formation postgraduée et continue

Ce programme est soutenu par - This program is supported by :



Zertifikat
Certificat
Certificado
Certificate

TRREE

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that

Rodwell Chindomu

a complété avec succès - has successfully completed

Informed Consent

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Clinical Trials Centre
The University of Hong Kong

Release Date: 2023/02/09

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator

APPROVED BY
SIWF FMH
ISFM

Foederatio Pharmaceutica Helvetiae
FPH
Programmes de formation postgraduée et continue

Ce programme est soutenu par - This program is supported by :

Appendix C: Request to conduct Research at the University of the Witwatersrand

FORM A - Request to conduct Research at the University of the Witwatersrand, Johannesburg

This form is to be completed by registered Honours/Master by Research/ PhD students and staff at Wits wishing to conduct research by using Wits student/staff data. Please email this form with your supporting documents to Research.Deputy-Registrar@wits.ac.za

First Name	Surname:
Rodwell	Chindomu

Staff/Student number:

	2186763

Degree currently registered:	School:
Master's in Education	WSoE

Research title:
Technology practices to promote equity, access, and quality in South African higher education: a case of four institutions

Has ethics clearance been obtained from the University Ethics Committee/School Ethics Committee?

YES	NO X

(If yes, please include a copy of the ethics clearance certificate and protocol number below)

Protocol number:

PLEASE NOTE: *If an unconditionally approved ethics clearance certificate has not been obtained, you will not be granted permission to conduct your research.*

Has your Head of Department/Supervisor granted permission for the research to be conducted?

YES X	NO

(If yes please include a copy of the letter of approval)

What is the expected duration of your research and on which date do you intend submitting the research?

One year. 31 November 2023

Whom is the research and/or questionnaire being conducted on?

Students	
Staff	X

(Please tick the appropriate box)

If the research will be conducted on student data please specify year of study /Faculty or degree data will be required for:

First Year Students	
Second Year Students	
Third Year Students	
Final Year Students	
Postgraduate Students	

1

Faculty	
Degree	

Section A:

How will the research be conducted?

E-Mail (please indicate if school administrators will be assisting in circulating the emails)	**Email**
Interviews (please attach a copy of the interview questions)	
Other data collection (please specify lists or statistics)	
Focus Groups	
Venues (If using a venue for your research, please indicate venue name and ensure arrangements have been made with the venue manager)	

Section B:

This section only needs to be completed for the circulation of questionnaires, surveys etc. by the University Registrar's Office:

Please provide the link for your questionnaire and attach a copy of the questionnaire (the link will be emailed to students in order for them to complete the questionnaire)	
Please provide us with a brief message that will accompany your questionnaire. This message ~~is~~ will be sent as an e-mail to students requesting them to complete the questionnaire.	

NOTE: If using REDCAP, circulation may take place with departmental administrators within your school. You need to make the necessary arrangements with the administrator.
However, if your department/school does not use REDCAP, then complete the section above.

Student signature: ..... **Date: 17/02/2023**

2

Appendix D: Proposal submission form

Faculty of Humanities

PROPOSAL SUBMISSION FORM

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

Proposal (please tick)	
MEd by coursework & research report 3000 - 4000 words	
MEd by Research: 6000 - 7000 words	
PhD: 8000 – 10,000 words	

All students must ensure they are registered for the current academic year!

This page to be completed by the student.

Person No. 2 1 8 6 7 6 3

Name of Student: Rodwell Chindomu

Name of School/Discipline: WSoE

Name of Programme/ Discipline: Master's in Education

Date: Year 2023 Month 02 Day 16

Signature:

Proposed Title: Technology practices to promote equity, access and quality in South African higher education: a case of four institutions

Date of School Seminar: Year Month Day

SYNOPSIS OF RESEARCH PROPOSAL (typed in English)

The proposed study intends to identify academics' digital technology practices and interrogate if, and how, such practices enhance digital access, equity and educational quality issues in South African higher education. The problem of the study is the disconnect between the technology policies of institutions (espoused practices) and the enacted practices of institutions and academics, which perpetuate inequitable digital access among students. study is qualitative in nature and, thus, it is foregrounded in the interpretivist paradigm. The theoretical and conceptual frameworks of the study are informed by the espoused and enacted technology use theory (Ertmer *et al.*, 2012) and the rights-based theory, which is a product of, among others, John Locke's social contract theory (Kimball, 2018; Hohfeld, 1919) and the United Nations' Universal Declaration of Human Rights of 1948. The study will use a multiple case study strategy, which involves four institutions, and it will use two data collection techniques namely: document analysis and open-ended questionnaires.

This page to be completed by Supervisor

ADVISORY REPORT BY SUPERVISOR ON PROPOSAL SUBMITTED TO THE FACULTY

As supervisor of the above mentioned candidate and in relation to the advice given in the booklet entitled "Writing a proposal" are you reassured that:

1) The candidate has adequately defined the central hypothesis to be tested, or the problem/ topic to be explored?

Yes, he has adequately defined the problem.

2) The candidate has provided adequate arguments (either empirical or theoretical) to justify undertaking the project?

Yes, he has.

3) The title is sufficiently brief and concise? YES [x] NO [ ]

4) That the candidate has:

i) provided a careful review of the pertinent existing research and adequately shown how the project will

a) relate to existing literature (Masters)

b) contribute to existing literature (PhD)

The candidate has adequately reviewed relevant literature on the topic

ii) (**For PhD candidates only**) indicate how the project itself will attempt to extend the existing thinking or research

5) The proposal develops a logical discussion of the theories to be used, while at the same time indicates an awareness of their methodological implication?

Yes, he has discussed the two theories he will be using and justified his selection of the two as suitable lens for hi

6) There is a appropriate discussion of the methodology to be used?

Yes, there is appropriate discussion of the methodology.

7) The scope is manageable for a research report (MA by coursework), dissertation (MA, or thesis (PhD), whichever applied), and is not overambitious or too exp[x]? YES [ ] NO

8) an adequate bibliography has been provided? YES [x] NO [ ]

9) In the case of an MA(FA) proposal, where there is an equivalent practical requirements:

i) does the candidate's proposal accord with specifications laid down in the discipline brochure? YES [ ] NO [ ]

ii) has the candidate articulated relation between the practical and the theoretical adequately? YES [ ] NO [ ]

10) If human subjects are being used, the proposal conforms to the presented ethical standards? YES [x] NO [ ]

11) There will be no problems with sources or access to sources?

No

12) The proposal has been properly referenced and proofread? If not, please elaborate. YES [x] NO [ ]

Name of Supervisor Nokulunga Sithabile Ndlovu Extension Number 73077

Signature of Supervisor [redacted] Date 19 February 2023

Signature of School Graduate Coordinator _____ Date: _____

Appendix E: Statement of Principles for Postgraduate Supervision

16. STATEMENT OF PRINCIPLES FOR POSTGRADUATE SUPERVISION

IN A CONTEXT OF ACADEMIC FREEDOM AND WITHIN A FRAMEWORK OF INDIVIDUAL AUTONOMY AND THE PURSUIT OF KNOWLEDGE THIS AGREEMENT IS WRITTEN IN THE BELIEF THAT THERE IS A RECIPROCAL RELATIONSHIP AND MUTUAL ACCOUNTABILITY BETWEEN SUPERVISOR AND STUDENT.

THE SUPERVISOR AND THE STUDENT:

1. Will establish agreed roles and clear processes to be maintained by both parties. In the case of joint supervision everyone's role needs to be clarified.
2. Will meet regularly and as frequently as is reasonable to ensure steady progress towards the completion of the proposal, research report, or dissertation or thesis. This time varies but the normal minimum requirement for face-to- face contact, spread across each year of registration is: 10 contact hours for an Honours project, 15 contact hours for a Masters by research report and 24 contact hours for a Masters by dissertation and a PhD.
3. Will keep appointments, be punctual and respond timeously to messages.
4. Will keep one another informed of any planned vacations or absences as well as changes in his or her personal circumstances that might impact on the work schedule. Unplanned absences or delays should be discussed as soon as possible and arrangements should be made to catch up lost time.
5. Will ensure that research on animal or human subjects is conducted according to the procedures and the requirements of the relevant University Ethics committee.
6. Will together complete progress reports on the research project, as requested by each Faculty Graduate Studies Committee.

THE SUPERVISOR:

1. Undertakes to provide guidance for the student's research project in relation to the design and scope of the project, the relevant literature and information sources, research methods and techniques and methods of data analysis.
2. Has a responsibility to be accessible to the student.
3. Will be prepared for meetings with the student. This includes being up-to-date on the latest work in his/her area of expertise.
4. Will expect written work as jointly agreed, and will return that work with constructive criticism within a timeframe (a suggestion of 2-4 weeks) jointly agreed at the outset of the research.
5. Will provide advice that can help the student to improve his/her writing. This may include referrals for language training and academic writing. The supervisor will provide guidance on technical aspects of writing such as referencing as well as on discipline specific requirements. Detailed correction of drafts and instruction in aspects of language and style are not the responsibility of the supervisor.
6. Will support the student in the production of a research report, dissertation or thesis. Provision should be allowed for adequate, mutually respectful, discussion around recommendations made.
7. Will assist with the construction of a written time schedule which outlines the expected completion dates of successive stages of the work.
8. Will ensure the student has the opportunity to present work at postgraduate/ staff seminars/national/international conferences as appropriate.
9. Will assist with the publication of research articles as appropriate.
10. Will discuss the ownership of research conducted by the student in accordance with the University guidelines and rules on intellectual property, co-authorship and copyright.
11. Will ensure that the research is conducted in accordance with the University's policy on plagiarism.
12. Will ensure that the student is made aware in writing of the inadequacy of progress and/or of any work where the standard is below par. Acceptability will be according to criteria previously supplied to the student.
13. Has a duty to refuse to allow the submission of sub-standard work for examination, regardless of the circumstances. If the student chooses to submit without the consent of the supervisor, then this should be clearly recorded and the appropriate procedures followed.

THE STUDENT:

1. Undertakes to work independently under the guidance of the supervisor. This includes reading widely to ensure that the literature pertinent to his/her chosen topic has been identified and consulted.
2. Is obliged to make appointments to see the supervisor and will arrange meeting times well in advance.
3. Will think carefully about how to derive maximum benefit from these contact sessions by planning what he/she wants in these sessions.
4. Should submit written work for discussion with the supervisor well in advance of a scheduled meeting. The kind and frequency of written work should be agreed with the supervisor at the outset of the research.
5. Undertakes to submit written work that is relatively free of basic spelling mistakes, incorrect punctuation and grammatical errors. Responsibility for the accuracy of language, the overall structure and coherence of the final research report, dissertation or thesis rests with the student.
6. Undertakes to heed the advice given by the supervisor and to engage in discussion around suggestions made. Ultimately the student has to take responsibility for the quality and presentation of the work.
7. Should strive, within reasonable bounds, to maintain a focus on his/her research area and to work within the agreed time schedule.
8. Will prepare material for presentations at seminars and conferences.
9. Undertakes to submit papers for publication.
10. Agrees to honour agreements about ownership of the research and in accordance with the University's guidelines and rules in relation to co-authorship, copyright and intellectual property.
11. Will ensure that the work contains no instances of plagiarism and that all citations are properly referenced and that the list of references is accurate, complete and consistent.
12. Agrees to work in accordance with the criteria of acceptability as supplied by the supervisor.
13. Undertakes not to place the supervisor under undue pressure to submit work for examination until the supervisor is satisfied that it has reached an acceptable level of quality.

I confirm that I have read and understood this statement and agree to be guided by its principles

Name of Student: Radwell Chindomu

Student's signature: Rad

Name of Supervisor: Nokulunga Sithabile Ndlovu

Supervisor's Signature: Ndlovu.

Name of Co-Supervisor: N/A

Co-Supervisor's Signature: N/A

Broad area of study: ICT in Education

Provisional submission date: 20-Feb-2023

Degree: Masters in Education

School: Education

Faculty: Humanities

Date: 19-Feb-2023

Specific agreements pertaining to: ownership and joint publication, funding, etc. may be attached and signed.

GRIEVANCE PROCEDURES. It should be acknowledged that during the course of the research, both students and supervisors can feel aggrieved. In this event, matters should be dealt with as swiftly as possible by the parties involved and, if necessary, the appropriate Postgraduate Coordinators and Committees. There is, in addition, a University Grievance Policy to help guide deliberations. It is available on www.wits.ac.za/prospective/postgraduate.

RC

Appendix F: School Ethics Form

University of the Witwatersrand, Johannesburg

Ethics Application Form for Human Research Ethics Committee (HREC Non-Medical)

(SCHOOL ETHICS COMMITTEES: Revised January 2021)

Instructions

1. This form must be completed by Honours (4th year) and Masters by Coursework and Research Report students who require ethics clearance, or for ethics clearance for coursework activities as part of a taught degree. Note that staff non-degree applications, PhD and research Masters students must complete the online form..
2. Completed applications must be submitted to the relevant School Ethics Committee.
3. Applications may be submitted as hard or soft (electronic) copies, but the first page of the application must contain the signatures of the student and supervisor. Final revised versions must be in soft (electronic) copy as all documentation will be archived.
4. Incomplete or handwritten applications will **NOT** be considered, including where signatures are missing.
5. Necessary supporting documents (e.g. *Participant Information Sheet, Consent Form*, copies of instruments, permission letters, etc), must be provided.

SECTION A

Complete this checklist to show what documents you have submitted and that you agree with the conditions of application.

X	Completed ***Ethics Application Form***.
X	Copy of the ***Research proposal***.
	Copy of proposed ***Research instruments*** (e.g. questionnaires/interview schedules).
	Participant Information Sheets (for each different sample group and/or instrument used).
	Consent forms (for each different sample group and/or instrument used).
	Relevant permission letters if required (from, e.g. company's HR department, National authorities such as Government departments, etc.) - consult the ***Guidance on the Use of Permission Letters*** document.
	SIGNATURES (REQUIRED)

Declaration: We, the signatories, declare that all information on this form is correct and that we will strive to maintain the highest ethical standards in this research at all times, according to disciplinary and university expectations, recognising that ethical practice in research is always a continuing process.

I recognise that it is my responsibility to conduct my research in an ethical manner according to Guidelines of the University of the Witwatersrand, according to any laws and/or legal frameworks that may apply, and according to the norms and expectations of my discipline. In preparing this Application for Ethics Clearance form, I have consulted the ***Guidelines for Human Research Ethics Clearance Application /Non-Medical*** (available on this website https://www.wits.ac.za/research/researcher-support/research-ethics/ethicscommittees/). In receiving ethics clearance, I agree to abide by the conditions of data collection as outlined in the *Guidelines* document.	[X] Yes	[ ] No

By signing this form, the researcher and supervisor of this project undertake to ensure that any amendments to this project that are required by the Human Research Ethics Committee (Non-Medical) and School Ethics Committees are made before the project commences.

	Date	Name	Signature*
Applicant	17/02/2023	Rodwell Chindoma	
Supervisor	17/02/2023	Dr. Nokulunga S. Ndlovu	

*electronic signatures are permitted but there are requirements governing this – please see *Guidelines for Applicants* document.

HREC (Non-Medical) Ethics Clearance Application – SCHOOL COMMITTEES

SECTION B

1. Summary of risk categories of this research project

1.1 Does this project involve human participants? [X] Yes [ ] No
If NO, an ethics waiver may be appropriate. Please complete the Ethics Waiver application form

1.2 I have read and understood the risk categories table: [X] Yes [ ] No
Applicants must have read the table of risk level category definitions on the final page of this document. This table is also available on the University Ethics Committee webpage.

1.3 The applicant must tick the box for the category that best applies to this project:

Risk category	Tick the appropriate box
No risk	
Minimal risk	X
Low risk	
Medium risk	
High risk	

Medium or high risk applications must be submitted by the School Ethics Committee to the University HREC

1.4 Are participants selected as **experts**? [X] Yes [ ] No
See the Guidelines for Applicants document for the definition of an expert

1.5 Will human participant research involve **vulnerable categories**? [ ] Yes [X] No

If YES state which ones:

If YES, how will **existing vulnerabilities** among research participants be addressed?

1.6 Does this research expose either the participant(s) or the researcher(s) to any **potential risks or harm** to which they would not otherwise be exposed? [ ] Yes [X] No

If YES, how will **potential risks or harm** be addressed?
See the Guidelines for Applicants document for guidance on a distress protocol, if needed

NB: Vulnerability is context specific. The term 'vulnerable categories' includes, among others, children under 18, orphans, prisoners, persons with cognitive or communication disorders, people who are traumatised or currently in traumatic situations. Vulnerable categories do not necessarily include poor or marginalised communities, older people, women, people with disabilities (unless it results in diminished capacity to give informed consent). Not all research involving "vulnerable categories" in Medium or High Risk research have vulnerability must be considered in terms of the nature of the research and the context in which the research is carried out. Where necessary, include details of steps to be taken to facilitate data collection across language barriers (e.g. interpretation or translation).

2. Researcher's personal data

Your family name: Chindomu	Your first name: Rodwell
Title: X Mr ___ Ms ___	Other : _____
School:	WSoE
Your student number:	2186763
Your email:	2186763@students.wits.ac.za
Your tel number:	0742594450
Name of supervisor(s):	Dr Nokuhanga S Ndlovu
Your supervisor's Wits email:	nokuhanga.ndlovu@wits.ac.za
Your supervisor's Wits tel number:	0117173077

2.1 Is this application for a multi-student project (i.e. several students working on exactly the same topic under the same supervisor)? ☐ Yes ☒ No

If YES: List the names and student numbers of additional students working on this project:

3. Research project

3.1 Title of research project:
Technology practices to promote equity, access, and quality in South African higher education: a case of four institutions

3.2 Is this research for degree purposes? ☒ Yes ☐ No

If no, for what degree?
☐ Honours ☒ Masters (research report) ☐ Other (specify) _____

3.3 Has the proposal been **approved** by the relevant School or Faculty higher degrees committee or other unit?
☐ Yes ☐ No ☒ Submitted and pending

3.4 Will any **additional researchers** be covered by this ethics protocol (including translators/interpreters, research assistants, etc. but not including supervisors)? No
☐ Yes ☒

If yes, please specify their names, affiliations and roles:

3.5 What are the **aims and objectives** of the research? (Please be specific)
1. To identify academics' technology practices and examine whether they promote equity, access and quality or not.
2. To establish guidelines for mitigating the gap between espoused and enacted institutional and academics' technology practices.

HREC (Non-Medical) Ethics Clearance Application – SCHOOL COMMITTEES

3.6 Summary or abstract of the research (100 words maximum)
Give a brief outline of the research plan such that reviewers can understand what the study is about, who the participants are, and how you will collect the data
The study is qualitative and it will utilise a multiple case study strategy involving four higher education institutions. Twelve academics (lecturers and teaching and learning coordinators/managers) will participate in the study by completing open-ended questionnaires. Data will also be collected through reviewing institutional documents related to educational technology policy.

3.7 Do you have any **financial or material interests or a relationship** associated with your research participants or with the organisations that you will be involved with in your research? (such as a familial relationship; lecturer/student relationship; collegial relationship; employer/employee relationship)

☒ Yes ☐ No

If yes, please explain how you will **manage any existing or potential conflicts of interest and potential coercion** during recruitment and data collection, if applicable:
I have a collegial relationship with participants from one of the four institutions. Any potential conflict will be minimised by explaining the nature and objectives of the study and upholding ethical standards, such as confidentiality, anonymity. The researcher will refrain from coercing the participants and will appraise them of their rights during and after participating in the study.

4. Formal permission

4.1 Where will the research be carried out? (Please give a specific location and / or the names of specific organisations or institutions) 1. University of the Witwatersrand

2. University of Johannesburg
3. Tshwane University of Technology
4. IIE Rosebank College (Braamfontein)

4.2 Has appropriate **formal permission been obtained**, if required (e.g. employer, government department, land owner, etc.)?

[ ] Yes (attached) No [ ] required Pending [X] must be supplied before ethics clearance can be g

NB: Obtaining permission is often necessary when conducting research within the premise of a particular site such as an ethnographic study of the functioning of a supermarket or a school, or the way staff interact with clients in a clinic or how members of a closed social media group interact/post on a specific topic. Permission is also required to use data from personal communication with participants or experts. Please note that any research done on Wits University campuses with employees or students of the University requires formal permission from the Registrar. Please read the detailed guidelines on Permission Letters from the Ethics website: https://www.wits.ac.za/research/researcher-support/research-ethics/ethics-committees/

(over)

5. How will data on human research participants be collected (instruments, methods, procedures)? (tick all applicable boxes) **(NB:** All applicable instruments must be attached to the application)

[ ]	Hard copy questionnaires or diagnostic tests, etc.
[X]	Online instruments (e.g. questionnaires, surveys)
[X]	Individual interviews (e.g. structured, semi-structured, etc.)
[ ]	Personal communication (e.g. email or informal conversation with experts)
[ ]	Group interviews (e.g. seminar/discussion groups, focus groups, etc.)
[ ]	Ethnographic observation, participant observation, other informal descriptive, and/or interactive methods (you **must explain** the ethnographic methods in the box below)
[ ]	Autoethnography
[ ]	Community-based methods or techniques such as drama workshops, community theatre, training workshops, participant rural appraisal, rapid rural appraisal, etc. (you **must explain** in the box below)
[ ]	Research on/in therapeutic or counselling contexts
[ ]	Putting on your own exhibition / public performance
[ ]	Observation of public performances, and/or public behaviour observation
[ ]	Photography
[ ]	Video recording
[X]	Audio recording (e.g. of interviews)
[ ]	Use of data from social media
[ ]	Other research methods or techniques (you **must explain** in the box below)

Explanation of **research methods** specified above, and / or explanation of any other **research methods that are not listed** above: The questionnaire will comprise open-ended questions. This will be complemented by

follow-up interviews with some of the participants to probe for further information and/or clarification on given feedback/responses.

6. Who will the research participants be?

6.1 List the **different** participant groups (e.g. experts, community members, key informants) that you will be working with in your project:
The participants will be experts in different academic disciplines and they will include lecturers, academic supervisors/coordinators/managers from different faculties of the case study institutions.

6.2 Description of these participant groups, including **age range** and **sample size**, for **each group**:
All the twelve participants are academics within the 24 to 65 age range. They all teach and/or manage teaching and learning in their institutions' schools of education.

7. How will informed consent be obtained?

7.1 How will **potential participants** be **identified / selected / recruited**?
Purposive sampling will be used to select the participants. This will entail sending emails to invite prospective participants and/or contacts from the respective institutions to participate in the study. Subsequently, consent forms will be emailed to the participants who would have expressed willingness to participate in the study. The participants will be requested to sign and return these forms to the researcher.

7.2 Will any **incentives** be offered to participants? [ ] Yes [X] No
(**NB:** it is NOT compulsory to offer any incentives. Please note for any curricula incentives, permission is required from the Registrar's office and DVC. Fiscal incentives are limited to R150 – see Guidelines document)

If **YES**, please explain:

7.3 How will informed consent be obtained?
[X] Formal (Signed form) [ ] Informal (e.g. verbal) [ ] Other (e.g. online survey)

If you cannot obtain **formal written consent**, explain why:

NB: Attach *Participant Information Sheet* and *Consent Form* for each sample group (please label these carefully), and/or other related materials. It is essential that participants in research be fully informed (irrespective of the method used) and then be able to agree on this basis to participate in the research.

8. Protecting participant identities

8.1 Can **confidentiality** of participants' responses be guaranteed throughout the **data collection** process?	[X] Yes	[ ] No
8.2 Can **anonymity** be guaranteed throughout the **data collection** process?	[ ] Yes	[X] No
8.3 Can **anonymity** be guaranteed in **resulting research reports** or publications?	[X] Yes	[ ] No

8.4 Explain how you will manage issues of **anonymity and confidentiality** in your project (What will participants be told in this regard?): The names of the participants and institutions will not be mentioned on the questionnaires or in any part of the research report. Code names will be used instead. The returned questionnaires will not be shared with any third party and they will be reposited in a password locked computer and folder.

Definitions: Confidentiality: that any information considered confidential by the participant or researcher will not be disclosed to others. ***Anonymity throughout the data collection process***: that you as the researcher will not be able to identify the participant. ***Anonymity in the resulting reports***: that the participant's name/identifying data will not be disclosed and that anyone reading your results will not be able to identify the participant. **NB**: While confidentiality may be desirable, it cannot be guaranteed in, for example, focus groups, or ethnographic observations. Similarly, anonymity should be preserved in questionnaires, but cannot be offered in workshop methodologies, focus group research, etc. Participants should have the right to remain anonymous in the final report and this must be respected in handling of all data relating to them. Participants need to be informed about these issues through the *Participant Information Sheet*.

9. Protection of data during and after the research

9.1 How will the data be protected while the research is **in progress**? (This includes how the identities of participants will be protected).

Returned questionnaires will not be shared with any third party and they will be reposited in a password locked folder. The identities of the participants and case study institutions will be anonymised by adopting pseudonyms such as P1, P2 or P7 (participants) and I1, I2, I5 and I4 (institutions). This will also be applied to any information or brand names that may compromise the anonymity of the participants and their institutions.

9.2 What is to be done with the research data **after completion** of the project? Please note that usage of data should be consistent with what is indicated to participants in the *Participant Information Sheet* and *Consent Form*.

	Stored in archives (specify below)		Stored in online database (specify below)
X	Stored in password protected computer	X	Stored in digital form with all identifying features removed
X	Stored for future secondary analysis		Destroyed after 5 years (insert numbers of years, if applicable)
			Please specify which archives **or online databases** will be used (if applicable):

NB: "Raw" or unprocessed data, especially **where the identity or personal data of research participants is included, must be safeguarded** and preserved from unauthorised access. Data may be destroyed after use, but **preservation in an archive or personal collection** may also be appropriate, desirable or even essential. For instance, datasets that contain **historically important information** or information that relates to **national heritage** must be preserved and should be placed in a public archive where possible and appropriate. An **online database** could include secure databases such as REDCAP, or open access databases (see loadb.org for examples). All data should be preserved in a way that **respects the nature of the original participants' consent**. If you are unsure about the procedure of data management and storage, please contact the Data Services Librarian.

10. Summary CV of applicant

ALL boxes in the following table must be completed by the applicant. Do not attach a formal CV to your application.

10.1 List your academic qualifications. Include dates or current registration status	Diploma in Education (1996) Bachelor of Education (2003) Postgraduate Diploma in Higher Education (2020)
10.2 Describe any ethics content/training* you have received in the previous 3 years (e.g. ethics short courses; online courses; ethics CPD courses; ethical input as part of a research methods course)	Completed the TIREE Introduction to Research Ethics, Research Ethics Evaluation, and Informed Consent online short courses. **Certificate attached**
10.3 List of instruments or methods used in this project, as listed in Section 5 of the application form. (Tick the appropriate boxes and describe these specific instruments if necessary)	[ ] Hard copy questionnaires or diagnostic tests, etc. [X] Online instruments (e.g. questionnaires, surveys) [ ] Individual interviews (e.g. structured, semi-structured, etc.) [ ] Personal communication (e.g. email or informal conversation with experts) [ ] Group interviews (e.g. seminar/discussion groups, focus groups, etc.) [ ] Ethnographic observation, participant observation, other informal descriptive, and/or interactive methods (you **must explain** the ethnographic methods in the box below) [ ] Autoethnography [ ] Community-based methods or techniques such as drama workshops, community theatre, training workshops, participant rural appraisal, rapid rural appraisal, etc. (you **must explain** in the box below). Research on/in therapeutic or counselling contexts [ ] Putting on your own exhibition / public performance [ ] Observation of public performances, and/or public behaviour observation [ ] Photography [ ] Video [X] Audio recording (e.g. of interviews) [ ] Use of data from social media [ ] Other research methods or techniques (you **must explain** in the box below): Explanation of **research methods** specified above, and / or explanation of any other **research methods that are not listed** above:
10.4 Describe your previous **experience** in deploying the instruments or methods of research which you are applying here (refer to Section 5 and table in Section 10.3)	I used document analysis for my Diploma in Education and Bachelor of Education research projects and I found it to be a challenging, yet exciting experience. It was frustrating when the available literature had some gaps such that some research questions would remain unaddressed. I recently used open-ended questionnaires when conducting my research study for the Postgraduate Diploma in Higher Education qualification. The key challenge with this instrument is unsatisfactory return rate and incomplete responses in some instances.

*Ethics training is strongly recommended, especially for postgraduate students. Please consult the *Guidelines for Applicants* document for details of training options.

Appendix G: Institutional approvals to conduct research



SCHOOL OF EDUCATION ETHICS COMMITTEE

CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE — **PROTOCOL NUMBER: 2023ECE014M**

PROJECT TITLE	Technology practices to promote equity, access, and quality in South African higher education: a case of four institutions
INVESTIGATOR	**Rodwell Chindomu**
SCHOOL/DEPARTMENT OF INVESTIGATOR	Wits School of Education
DATE CONSIDERED	12 June 2023
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	Minimal risk
EXPIRY DATE	Date of submission of the Research Report
ISSUE DATE OF CERTIFICATE	**CHAIRPERSON**
26 June 2023	Dr. Batseba Mofolo-Mbokane

cc: Dr Nokulunga S Ndlovu

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the above mentioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

Signature — Date 27 / 06 / 2023



UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG | WSoE Wits School of Education

Prof Juliet Perumal Ph.D.
Head: Wits School of Education
Faculty of Humanities
University of the Witwatersrand
juliet.perumal@wits.ac.za

20 August 2023

Attention: Rodwell Chindomu
Student Number: 2186763
Programme: Master of Education by Coursework and Research Report

Re: Letter of Approval to conduct research in the Wits School of Education (WSOE)

This letter serves to confirm that the project titled **"Technology practices to promote equity, access, and quality in South African higher education: a case of four institutions"** has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants.

In undertaking this research, Mr. Chindomu agrees to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If this research is being conducted on certain student cohorts, year groups, or courses within the WSOE and within the teaching term, permission must be sought from the individual academics.

We wish Mr. Chindomu the best of luck in his research endeavours.

Sincerely,
Prof. Juliet Perumal

21 August 2023

Rodwell Chindomu
University of the Witwatersrand (WITS)

Dear Rodwell Chindomu

PERMISSION TO CONDUCT RESEARCH AT THE UNIVERSITY OF JOHANNESBURG

The request for the project titled *Technology practices to promote equity, access, and quality in South African higher education: a case of four institutions* refers. Permission is granted to conduct this study at the University of Johannesburg (UJ).

Please note that the granting of permission does not make it mandatory for UJ students and/or staff to participate in the study. As the researcher/applicant, you will need to engage with potential participants to obtain their consent to participate in the study.

Should you require assistance in distributing the survey to UJ students and/or staff, kindly send a brief description of your study together with the link to where participants can access the survey to tdewet@uj.ac.za, copying hemalij@uj.ac.za and nbools@uj.ac.za.

Sincerely



Dr Ndivhuwo Lurulli
Executive Director: Research and Innovation
Email: nmlurulli@uj.ac.za

THE INDEPENDENT INSTITUTE OF EDUCATION

BAC

Vega

Varsity College

Rosebank College

MSA

SCHOOL OF HOSPITALITY & SERVICE MANAGEMENT

Reference: R.15905 [RPGS04]
Enquiries: research@iie.ac.za

28 September 2023

Letter of Institutional Consent

Initials and surname:	R Chindamu
Institution Registered at:	University of the Witwatersrand
Qualification:	Master of Education
Title of study/paper:	Technology to promote equity, access, and quality in higher education: a multi-case study.

Dear Rodwell Chindamu

We are pleased to inform you that the IIE Ethics Committee has reviewed and provided consent to utilise IIE staff, students, or artefacts to complete your research project entitled "Technology to promote equity, access, and quality in higher education: a multi-case study."

The following conditions are the standard requirements attached to the approval of all applications to conducts research involving human participants:

- Approval will be for a period of two (2) years, starting from the date of approval.
- You should notify the IIE Ethics Committee regarding any alteration to the approved project.
- You should notify the IIE Ethics Committee in the event of any adverse effects on participants or of any unforeseen development that might compromise the ethical integrity of your research project.
- The researcher(s) will need to obtain informed consent in writing from the participants/ respondents in their sample if the study is not anonymous.
- A copy of this letter must be forwarded to the relevant person(s) at the campus/es that would be involved in this research study.
- Research must be conducted in such a way that the normal programme and operations of the campus / office is not interrupted.
- A report and a copy of any published outputs should be submitted to the IIE Ethics Committee upon the completion of the project.
- You are required to uphold the IIE's Ethics stance as described in the Research and Postgraduate Studies Policy (IIE007). The policy is available on the institutional website.

on behalf of The IIE Ethics Committee



Dr WH Engelbrecht
Dean: Research and Postgraduate Studies
The Independent Institute of Education

Appendix F: Signed Consent Forms

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. (YES) NO

I understand that I can volunteer to take part in the study (YES) NO

I agree that the interview may be audio recorded (YES) NO

I agree that direct quotations from my interview may be used by the researcher in their research report (YES) NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report (YES) NO

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on (YES) NO

..... (signature or mark)
23/09/2023..... (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES	NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES	NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

..... (signature or mark)
19/09/2023 ..... (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES	NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES	NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

..... (signature or mark)
..... 23 August 2023 ..... (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES NO
I understand that I can volunteer to take part in the study	YES NO
I agree that the interview may be audio recorded	YES NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES NO

Tmuaaba ..... (signature or mark)
21/09/2023 ..... (date)

..... (signature)
Rodwell Chindomu ..... (name of researcher/person seeking consent)
1 August 2023 ..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. YES NO

I understand that I can volunteer to take part in the study YES NO

I agree that the interview may be audio recorded YES NO

I agree that direct quotations from my interview may be used by the researcher in their research report YES NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report YES NO

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on YES NO

BHL
..... (signature or mark)
12 August 2023
..... (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. YES NO

I understand that I can volunteer to take part in the study YES NO

I agree that the interview may be audio recorded YES NO

I agree that direct quotations from my interview may be used by the researcher in their research report YES NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report YES NO

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on YES NO

JPMatongo
..... (signature or mark)
29/9/23
..... (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. YES NO

I understand that I can volunteer to take part in the study YES NO

I agree that the interview may be audio recorded YES NO

I agree that direct quotations from my interview may be used by the researcher in their research report YES NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report YES NO

I agree that other researchers may use the information I provide in my NO interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on YES

V.Z. ..... (signature or mark)
01/10/2023 ..... (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. YES NO

I understand that I can volunteer to take part in the study YES NO

I agree that the interview may be audio recorded YES NO

I agree that direct quotations from my interview may be used by the researcher in their research report YES NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report YES NO

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on YES NO

..... (signature or mark)
22 September 2023 (date)

..... (signature)
Rodwell Chindomu..... (name of researcher/person seeking consent)
1 August 2023..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. YES NO

I understand that I can volunteer to take part in the study YES NO

I agree that the interview may be audio recorded YES NO

I agree that direct quotations from my interview may be used by the researcher in their research report YES NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report YES NO

I agree that other researchers may use the information I provide in my NO interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on YES

F.B ..... (signature or mark)
26/9/2023 ..... (date)

..... (signature)
Rodwell Chindomu ..... (name of researcher/person seeking consent)
1 August 2023 ..... (date)

Consent Form

Title of project
Technology practices to promote equity, access and quality in South African higher education: a multi-case study.

Name of researcher: Rodwell Chindomu

I agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about. (YES) NO

I understand that I can volunteer to take part in the study (YES) NO

I agree that the interview may be audio recorded (YES) NO

I agree that direct quotations from my interview may be used by the researcher in their research report (YES) NO

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report (YES) NO

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on (YES) NO

MMP ..... (signature or mark)
28.09.22 ..... (date)

R ..... (signature)
Rodwell Chindomu ..... (name of researcher/person seeking consent)
1 August 2022 ..... (date)