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Information and Communication Technology Capabilities for Pre-service Teachers in South Africa: An Education Policy Analysis

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Abstract. In South Africa's evolving education system, integrating Information and Communication Technologies (ICTs) in teacher education has become increasingly vital. This article critically examines how contemporary South African teacher education policy—specifically the Minimum Requirements for Teacher Education Qualifications (MRTEQ, 2015)—conceptualises the role of ICT in pre-service teacher training. Drawing on the Capability Approach (CA), the article explores whether MRTEQ adequately addresses the diverse backgrounds and digital readiness of pre-service teachers and supports the development of their ICT competencies. The study explores ICT capability development in teacher education using the CA, an evaluative framework emphasising individuals' freedoms and opportunities. A conceptual research design (CRD) was employed in this study, which is a qualitative research design associated with ideas and concepts about a phenomenon being studied. Interpretivism was used as the paradigm, and the analysis highlights the complex interplay between policy intentions and implementation realities. Embedding ICT within fundamental and disciplinary learning is challenging. While MRTEQ promotes a progressive vision for digitally capable educators, infrastructural constraints, unequal access, and varied student experiences remain significant barriers. Moreover, there is no standardised approach to ICT integration in teacher training in South African Universities. This study ultimately argues for a more inclusive and practical approach to ICT integration in teacher education, one that aligns policy frameworks with the lived realities of pre-service teachers and enhances their capabilities to navigate and innovate in 21st-century classrooms. An important avenue for further research may be a quantitative study that tests the identified capabilities and views of the PST in terms of what MRTEQ (2015) advocates.

Keywords: Information and Communication Technologies; Policy; Capability Approach; Pre-service Teachers

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1. Introduction

Like most developing countries, South Africa (SA) increasingly acknowledges the future prominence of ICTS in teaching and learning. Information and communication technologies are significant in shaping the new global economy and producing rapid changes in society and education (Bladergroen & Chigona, 2019). As such, ICT also have the potential to transform the nature of pre-service teachers' (PSTs) training. Learning to teach is dynamic because there are influences from curriculum, policy, school environments and pre-service teachers' personal beliefs (Schneider & Randel, 2021). Learning to teach is distinct in that pre-service teachers enter teacher education courses with diverse dispositions, educational experiences, life experiences, beliefs and values (Li & Wong, 2023).

PSTs should be expected to show critical understanding, knowledge, and leadership skills during and after their years of study in higher education institutions (Caliskan, 2020). Many PSTs come from backgrounds where exposure to ICT prior to university is minimal, meaning they start their training at a disadvantage compared to peers from more affluent or urban settings (Jita, 2018). Furthermore, there is no standardised approach to ICT integration in teacher training in South African Universities (Ngololo & Chigona, 2021). Therefore, skills and abilities are required to navigate the evolving landscape characterised by the increasing significance of ICTs (Siarova et al., 2017). This expectation implies that higher education institutions should promote ICT opportunities concerning learning and teaching (Panakaje et al., 2024).

In the South African context, the Minimum Requirements for Teacher Education Qualifications Policy (MRTEQ, 2015) requires all teacher education programmes to address the critical challenges facing education in SA today by incorporating different knowledge that will assist teachers in developing competencies that enable them to deal with transformation (DHET, 2015). This expectation underestimates the complexity of integrating different knowledge and recontextualising them into practice-based contexts. Bertram (2019) argues that while MRTEQ (2015) provides a progressive framework, challenges persist in implementation, particularly regarding the alignment between policy intentions and practical realities in South African teacher education. This expectation underestimates the complexity of integrating different knowledge and recontextualising them into practice-based contexts.

MRTEQ (2015) provides a basis for constructing core curricula for Initial Teacher Education (ITE) and pays close attention to the various knowledge types underpinning teachers' practice. MRTEQ (2015) indicates that fundamental learning underpins teachers' practice. Fundamental learning in the context of teacher education in SA refers to using ICTs competently. It is expected to be integrated into other types of learning, especially Disciplinary Learning for innovative teaching and enhanced learning (DHET, 2015, Section 3.8). Chai et al. (2010) indicate that for PSTs to integrate technology into instruction effectively, their technology education must include fundamental computer training and technical ability (Enochsson & Rizza, 2009). This may consequently enhance the

quality of instruction and the urge to use technology for instruction (Yildiz-Durak, 2021).

It is essential to recognise that to integrate technology in teacher training institutions, PSTs need to be equipped to feel positive about using technologies. While integrating theory and practice is widely advocated, achieving this in IT capability development requires addressing systemic barriers such as infrastructure deficits and limited exposure to practical applications (Janse van Rensburg, 2020). Equipping PSTs with appropriate digital competencies will enable them to address the evolving needs of 21st-century learners and effectively handle the demands of the modern workplace (Buerkle et al., 2023).

Instefjord (2022) indicates that fostering digital competencies would empower PSTs to create inclusive, innovative, and technology-enhanced learning environments that promote critical thinking and lifelong learning skills. PSTs thus need to draw on their knowledge base to "have a sound subject knowledge", "know how [their learners] learn", "communicate effectively to mediate learning", "identify learning or social problems", "assess in reliable and varied ways", and "reflect critically, in theoretically informed ways" (DHET, 2015, p. 62).

In keeping with the CA articulated by Klees (2017), education provides opportunities which enable freedom for people to lead the lives they have reason to value, and to broaden the choices presented to them. PSTs bring different knowledge resources to the university. Thus, we consider it significant that individuals should understand whether implementing policies will assist PSTs, irrespective of their backgrounds, in obtaining quality education and expanding their capabilities. Within the context of IT in teacher education, the CA offers a comprehensive framework for evaluating how policies shape the development of PSTs' IT capabilities. Recognising that PSTs enter teacher education programs with varying levels of access to technology and differing socioeconomic circumstances, it is imperative to interrogate whether existing pre-service training policies are inclusive and adequately address their IT capabilities in learning to teach.

PSTs need to know how to draw on that specialised teacher knowledge; moreover, they need to employ information technology capabilities. Furthermore, Buerkle (2023) emphasise that by embedding digital skills within teacher education programs can promote pedagogical innovation and support student-centred learning practices.

We then ask the following question:
How can analysing a South African education policy contribute to ICT capabilities for pre-service teachers?

2. Literature Review

According to Darling-Hammond et al. (2020), attention must be given to teachers' 21st-century skills and their training and evaluation to educate learners of the twenty-first century. Sibanda and Marongwe (2022) concur that education ought

to be pertinent, responsive, and flexible to societal demands and changes. They highlight the value of introducing digital education as a crucial tool for sustainable development. Teacher education programmes in SA face numerous challenges, one of which is the failure to integrate technologies into the training of PSTs (Chisango et al., 2020).

Integrating ICTs in education has become an essential aspect of PST, particularly in developing countries like SA (Bladergroen et al., 2012). According to the South African Professional Digital Competency (PDC) Standards, ICT in the context of teacher education encompasses four interrelated domains. These domains include the following: hardware and digital infrastructure (e.g., devices, smartboards), networked platforms and cloud services (e.g., LMS, Google Classroom), digital content and data literacy, and pedagogically oriented software ecosystems (e.g., educational apps, simulations) (DBE & DHET, 2023). While ICTs offer transformative potential in education, their effective implementation requires teachers to possess the necessary skills and knowledge (UNESCO, 2018).

MRTEQ (2015) indicates the importance of ICT integration in PSTs' training as part of fundamental learning. The White Paper on e-Education (DoE, 2004) also mandates that ICT integration should be embedded in PSTs (DoE, 2004). Therefore, universities must ensure that ICT skills are part of training programmes for PSTs, equipping future teachers with the competencies to integrate technology effectively into their teaching. MRTEQ (2015) only highlights the basic competences of a beginner teacher. They include sound content knowledge, subject methodology, understanding individual learners' needs, communication ability, knowledge about the school curriculum, and understanding diversity in the South African context.

UNESCO (2018) highlights that successful ICT integration requires teachers to reimagine learning structures, merge pedagogy with technology, and encourage collaboration and active learning. Despite the aims of policy, many PSTs report feeling underprepared. Despite its potential, ICT integration within teacher education faces multiple challenges, amongst others:

- limited infrastructure and resources: lack of technological access hinders PSTs from engaging in authentic ICT-based learning (Cheung et al., 2021; Tonduer et al., 2018) and
- variability in ICT training: universities offer inconsistent ICT training, leading to disparities in PSTs' digital competencies (Oubibi et al., 2022).

PSTs require a set of professional capabilities to enact responsive and effective teaching (Mangundu et al., 2023). Developing highly skilled and effective teachers is crucial for addressing the needs of learners in SA and achieving the Sustainable Development Goals (SDGs). Nakidien et al. (2021) emphasise that qualified and competent teachers are essential for realising SDG 4, which aims to ensure inclusive and equitable quality education for all. Furthermore, the Trialogue Knowledge Hub (2020) highlights that investing in teacher development supports the broader objectives of the SDGs by enhancing educational outcomes and promoting lifelong learning opportunities. It is thus crucial for teachers to have

the acquired capabilities to ensure that learners are provided with an education that promotes critical thinking, reflection skills, the understanding of people and the realistic background that they come from to ensure active participation to improve the society (Limbada & Kajee, 2020). Therefore, PSTs should be trained to have the skills and capabilities to integrate various forms of knowledge, particularly IT, when learning how to teach. Some capabilities that are required from teachers are to have collaborative skills, reflection, to be accountable for moral values and commitment to education, and to be able to understand how to integrate theoretical and practical knowledge and skills (Pantić & Florian, 2015).

Integrating IT capabilities in teacher education has been recognised as essential for the 21st-century classroom (Angayarkanni et al., 2024). Pre-service teacher programs that combine theoretical instruction with practice in authentic teaching scenarios have improved confidence and competence in using technology (Lu et al., 2025). Furthermore, effective teaching with technology requires synthesising pedagogical strategies, subject content, and technological tools. Thus, incorporating technology into teaching requires more than technical knowledge; PSTs must understand its pedagogical applications (Angayarkanni et al., 2024).

In terms of international studies, the following two studies indicate how higher education includes ICT in the training of PSTs. Alqahtani and Alqahtani (2023) suggest that in Australia, teacher education is closely linked to the ICT policies, whilst Gleason (2018) stated that in Singapore, higher education institutions find it essential to produce digitally literate graduates who can effectively navigate a technologically advanced environment.

In Africa, teacher education faces the dual challenge of resource limitations and diverse educational needs. Efforts to integrate IT into pre-service teacher training often highlight the importance of locally relevant, context-specific approaches. For instance, initiatives incorporating community-based teaching with technology aim to address rural education disparities (Unwin et al., 2018). Studies in Sub-Saharan Africa emphasise the need for professional development that aligns theoretical training with practical applications in under-resourced environments. Haßler et al. (2021) present a comprehensive set of eight principles for teacher professional development in Sub-Saharan Africa, advocating for holistic, school-based, peer-facilitated models that are both educationally effective and cost-efficient.

Similarly, Ajani (2023) highlights the significance of context specific, learner-focussed pedagogies and continuous professional development to improve academic outcomes in African contexts. Emphasizes the importance of context-specific, learner-focused teaching methods and continuous professional development to improve academic outcomes in African settings.

In SA, MRTEQ (2015) underscores the need for an integrated and applied approach to teacher education. This policy document promotes the development of both disciplinary and pedagogical knowledge, ensuring that pre-service teachers can effectively incorporate IT into teaching practices (DHET, 2015). The

Integrated Strategic Planning Framework for Teacher Education and Development (ISPFTED) also emphasises the role of reflective practice and professional learning communities in addressing gaps in IT skills (DHET, 2011). The TPACK model, as conceptualised by Koehler and Mishra (2009), postulates that this model could provide a valuable framework for implementing MRTEQ's goals. By focusing on the intersection of technology, pedagogy, and content, South African institutions can better prepare pre-service teachers for diverse classroom settings. However, challenges remain, including inconsistent access to IT resources and varying levels of digital literacy among teacher candidates.

Research in SA by scholars such as Kotze (2022) further reveals that while institutions strive to provide theoretical and practical IT training, pre-service teachers often lack consistent exposure to real-world classroom applications. In addition, Ngololo and Chigona (2021) highlight that although PSTs may receive theoretical training in ICT during coursework, their teaching practice placements are in schools with limited or no ICT infrastructure, rendering them unable to implement what they have learned. This creates a dissonance between policy ideals and classroom realities. Madzima and Ngwenya (2018) found that ICT integration in PST programmes remains fragmented, with significant disparities in the quality, depth, and structure of ICT components across institutions.

Their study emphasised the lack of a national implementation framework to guide institutions in aligning their ICT curricula with MRTEQ's expectations. Initiatives like Professional Learning Communities (PLCs) and diagnostic assessments have been recommended to identify and address gaps in IT competencies (DHET, 2011). In line with South Africa's broader goals for digital transformation in education, MRTEQ emphasises that ICT competence should be embedded in both the theoretical and practical dimensions of initial teacher education (ITE).

PSTs equipped with digital skills may thus employ technology to facilitate collaboration, communication, and problem-solving within and beyond the classroom (Ally, 2019). In their empirical study, Nhlumayo and Pule (2025) revealed that although PSTs felt confident in using ICT, only a few applied them during practicum due to poor integration of ICT pedagogy into subject-specific training. Furthermore, in low-resourced schools, ICT are often unavailable, making it difficult for PSTs to apply what they've learned (Nhlumayo & Pule, 2025).

This gap limits their ability to plan, adapt, and collaborate using digital methods. As such, teachers' professional capabilities may be strengthened, and their ability to contribute to broader societal goals, such as economic growth and innovation, thereby advancing the overall agenda of sustainable development. Finally, integrating theory and practice in developing IT capabilities among pre-service teachers is essential for effective teaching in modern classrooms (Yildiz-Durak, 2021).

2.1 Theoretical Lens

Unlike widely used frameworks such as the Technology Acceptance Model (TAM), TPACK, or UTAUT2, which focus primarily on technology use and behavioural intent, the CA (Robeyns, 2017; Sen, 1999) foregrounds what individuals are substantively free to do and to be. In the context of ICT in teacher education, the CA allows us to assess proficiency. CA has the potential to uncover the extent to which pre-service teachers can convert available digital resources into pedagogically meaningful functions (Reinhardt & ZDM Team, 2024).

This paper is guided by the CA, pioneered by Amartya Sen, which provides a framework for evaluating individual well-being and social arrangements, emphasising the importance of enabling people to achieve valuable states of being and doing (Sen, 1992). Whereas traditional competency models emphasise measurable outcomes and standardised skills, the CA focuses on what individuals can do and be, which involves expanding people's freedoms and opportunities to live the kind of life they value (de Wet & de la Harpe, 2016).

According to Sen (1993, p. 30), the CA is "concerned with evaluating a person in terms of his or her actual ability to achieve various functioning as part of living and takes the set of individual capabilities as constituting an indispensable and central part of the relevant informational base of such evaluation." Capabilities are real opportunities a person has, either to be or to do certain things; they represent the opportunity to achieve valuable combinations of human functionings (Robeyns, 2005). Thus, capabilities are the fundamental freedoms or opportunities to achieve functioning. The approach focuses mainly on people's capability to have the freedom to do things (Sen, 1999).

Freedom plays a vital role in the enrichment of individual abilities so that people can be more independent and help themselves (Sen, 1999). Gangas (2016) indicates that capabilities refer to the potential and actual power of what a person can do and achieve regarding valued choices. Functionings are the corresponding achievements of those 'beings and doings' (the various things a person may value doing or being (e.g., being literate, healthy, educated). Functionings represent what a person actually does, the life that a person lives, and a person's well-being (or ill-being) achievements.

The CA acknowledges the diversity of human beings and the context in which they live. The CA insists that the contexts in which development and social interaction transpire, and whether the conditions under which people choose from their opportunities, ought to be investigated for their inclusive and enabling characteristics (Robeyns, 2005). Education is seen as a fundamental capability that affects the expansion of other essential capabilities. Thus, having access to education enables and expands a range of other human freedoms. The CA recognises education's beneficial influence on human well-being; educational achievement enables a person to attain a collection of basic cognitive functions essential for accomplishing other human functionings (Barnett, 2021).

According to CA, if education is to enhance development fully, it must address the diverse learning needs of all individuals through the distribution of resources, and education must be of the quality that leads to learning outcomes that ultimately enhance individual freedom and choices. The CA becomes relevant to the study because functionings refer to concrete achievements to be educated, whilst capabilities refer to the freedom or effective opportunities to achieve these functionings and become the best version of themselves during the training of PSTs. The CA thus accounts for structural inequalities and supports the development of agency, adaptability, and context-sensitive practice.

3. Methodology

A conceptual research design (CRD) was employed in this study, which is a qualitative research design associated with ideas and concepts about a phenomenon being studied, attempting to suggest possible solutions to real-life problems (Hirschheim, 2008). Conceptual research does not rely on empirical data to support its arguments but rather applies evidence grounded in recent literature, supported by intelligible, captivating reason (Vargo & Koskela-Huotari, 2020). CRD was useful because it enabled us to search for advanced thoughts in MRTEQ (2015) and other related literature in terms of the aim of this study. We employed interpretivism as the paradigm in this study. Kivunja and Kuyini (2017) state that interpretivism as a paradigm allows the researchers to understand a phenomenon comprehensively from numerous perspectives, because an interpretive attitude presupposes that reality is subjective and is constructed based on researchers' interpretation of the data.

This paper dealt with interpreting texts from the policy document MRTEQ (2015), and a document analysis was done through a combination of primary and secondary sources. The qualitative methodology was significant in this study. Qualitative research is an exploratory method (Mohajan, 2018) that seeks to understand a phenomenon; it is non-mathematical, contextualised, and interpretive (Nassaji, 2020). Thus, having employed a qualitative research approach, we learned more about how MRTEQ (2015) policies can contribute to understanding the capacities needed for ICT integration in PST training.

The data was collected through a literature review and a text analysis of the MRTEQ (2015) policy document, specifically addressing ICT-related aspects. This was done to investigate which skills and competencies are promoted and advanced through MRTEQ (2015) concerning the training and learning of PSTs in the South African HEI context. In SA, the MRTEQ (2015) policy governs processes and practices related to teacher education (MRTEQ, 2015), reiterating the importance of teacher education programs exposing PSTs to ICT skills.

Therefore, the MRTEQ (2015) stipulations were purposively selected to interpret how they can provide information technology capabilities that HEIs can apply to equip pre-service teachers to learn how to teach. There were no set rules for deciding the sample number concerning the total stipulations analysed (Patton, 2002).

However, we were cognizant that the number of stipulations would be sufficient to make meaning of the role of ICT in pre-service teacher training. We used data saturation as a guiding principle (Polit & Beck, 2017), implying that we analysed stipulations to the point at which we recognised no new information regarding perspectives about capabilities for information technology teaching from an education policy perspective. We conducted an analysis of documents and policies in this study instead of using any human participants. Although no human subjects were involved, ethical considerations were observed through the responsible citation and interpretation of publicly available policy texts. Therefore, every source used is cited in the reference list and as an in-text reference (Creswell, 2012).

To ensure an honest report and accurate picture of the data generated from the policy documents, we held discussions and referred to the education-related documents and policies analysed. We developed themes and used verbatim quotations to depict the original policy texts. Furthermore, it took time to become acquainted with the South African higher education policies' context, nature, and setting (Mandal, 2018) to gather enough data to answer the research question.

4. Findings and Discussion

The following analysis explores how current policy frameworks, particularly those within MRTEQ (2015), understand the role of ICT in pre-service teacher training and what ICT competencies contemporary teacher education policy (MRTEQ, 2015) in SA advocates. Lowenberg Ball et al. (2008) indicate that policies should be regarded as conversational approaches, collections of actions, texts, objects, and practices that speak to broader social developments of teaching, such as the construction of the aim of teaching and the structure of the teacher.

In an attempt to analyse the MRTEQ (2015) in pursuit of IT capabilities, we propose the following criteria as indicated in Barnett (2014), namely, select policy stipulation(s), identify possible capabilities, explain the identified capabilities, and explicate how the identified capabilities could be applied in real-life situations to ensure effective policy implementation. In this study, ICT is predominantly treated as a means to an educational end, specifically enabling pre-service teachers to develop and demonstrate the identified capabilities in diverse and inclusive pedagogical contexts, which South African Higher Education presents.

Next, we shall present the stipulations from the MRTEQ (2015) that identify the IT capabilities respectively, and since the paper was based on the CA, it will be used as a basis for the discussion to follow.

4.1 Adaptability as an IT capability

MRTEQ (2015) stipulates that "*newly qualified teachers must possess highly developed literacy, numeracy, and Information Technology (IT) skills to navigate the demands of modern classrooms effectively.*" Furthermore, proficiency in IT is increasingly critical in contemporary education, as digital tools and online learning platforms have become integral to teaching and assessment practices. Teachers who lack these

competencies may struggle to implement innovative pedagogical strategies, differentiate instruction, or engage in data-driven decision-making to enhance learner outcomes. Given the rapid advancement of educational technology, teacher education programs must ensure that graduates have the necessary digital literacy skills to integrate technology meaningfully into their practice.

Thus, the MRTEQ (2015) stipulation underscores the necessity of a well-rounded skill set that enables newly qualified teachers to be adaptable, responsive, and effective in diverse educational contexts. Adapting to the changing situations in these ever-changing environments is an important capacity for thriving and effective teachers. This is known as adaptability, or the capacity of individuals to adjust their thoughts, feelings, and behaviours in response to new, changing, or uncertain situations (Martin et al., 2012). The PST often enters teacher education programs with varied dispositions, educational backgrounds, life experiences, and technological skills (Sheridan, 2013).

Despite these differences, there is a consistent expectation for them to demonstrate critical understanding, knowledge, and leadership skills, aligning with global and national education standards (Caliskan, 2020). However, significant disparities exist in the pre-service teachers' exposure to and confidence in using IT, which impacts their ability to integrate technology into teaching effectively.

Intrinsically, MRTEQ (2015) urges in Stipulation 1 that the PST should "develop IT skills ". A key finding is the systemic barriers higher education institutions face in implementing IT capabilities in teacher education programs. These barriers include limited access to infrastructure, inadequate exposure to practical applications, and a lack of alignment between theory and practice. Addressing these challenges requires a systemic approach, as outlined in the MRTEQ (2015) policy (DHET, 2015), which emphasises the integration of ICT into teacher training to address diversity and transformation.

Pre-service teachers could demonstrate varying levels of IT competence upon entering teacher education programs, underscoring the need for foundational computer training and technical ability (Chai et al., 2010). This finding aligns with Enochsson and Rizza's (2009) argument that IT education must emphasise both technical proficiency and pedagogical application to enhance instructional quality.

The integration of ICT into teacher training programs remains inconsistent across institutions (Kanyemba & Sithole, 2024). While MRTEQ (DHET, 2015) advocates for ICT integration, implementation challenges such as resource limitations and uneven institutional support hinder progress. The exposure to ICT in their training is often limited to theory, with minimal opportunities for practical application (Swai et al., 2022). This highlights the need for innovative approaches, such as simulated classroom environments, to enhance IT capability development.

Institutional policies and frameworks, such as MRTEQ (DHET, 2015), are crucial in guiding IT integration into teacher education. However, there are gaps between policy intentions and actual practice, particularly in addressing infrastructure deficits and fostering digital competencies. Institutional investments in technology and capacity-building initiatives for educators should complement policy-driven interventions. Equipping pre-service teachers with IT capabilities fosters pedagogical innovation and supports student-centred learning approaches. Positive experiences are reported with PLCs and school partnerships, which provided practical exposure to integrating IT into teaching. These strategies enhanced confidence and competence in using technology, aligning with Buerkle et al.'s (2023) recommendation for collaborative and experiential learning approaches.

Systemic barriers, such as infrastructure deficits, are significant obstacles to the development of IT capability. There is a need for sustained investment in technological resources and support systems within teacher education institutions. Additionally, fostering a culture of collaboration between institutions and schools was seen as essential in creating environments where theory and practice converge seamlessly.

4.2 Creativity as an IT capability

The following analysis explores how current policy frameworks, particularly those within MRTEQ (2015), understand the role of ICT in pre-service teacher training and what ICT competencies contemporary teacher education policy requires. According to the MRTEQ (2015), "*newly qualified teachers must thoroughly understand the school curriculum and be able to unpack it's specialised content to facilitate effective teaching and learning.*" A deep knowledge of curriculum frameworks enables teachers to align instructional strategies with learning outcomes, ensuring that lessons are both structured and meaningful (Shulman, 1987).

Additionally, using available resources appropriately is essential for designing and implementing engaging and differentiated learning programmes that cater to diverse learner needs (Loewenberg Ball et al., 2008). Without this competency, teachers may struggle to scaffold learning effectively or adapt materials to accommodate varying levels of understanding (Darling-Hammond, 2006). Thus, curriculum knowledge and resourcefulness in lesson planning are critical for ensuring high-quality education and learner success (DHET, 2015).

MRTEQ (2015) also indicate that "*The educator will understand and interpret provided learning programmes, design original learning programmes, identify the requirements for a specific context of learning and select and prepare suitable textual and visual resources for learning.*" The educator will also select the sequence and pace of the learning in a manner sensitive to the differing needs of both the subject and the learners. Using "original, prepare suitable textual and visual resources "as a form of creativity. Creativity is seen as a special learning approach that involves "creative" teaching and "creative" learning strategies in educational settings.

These strategies facilitate learning and result from appropriate teaching and learning. The term "creativity" is used in three ways: it refers to a set of processes

(e.g., "creative" thinking), a group of personal characteristics of people (e.g., the "creative" personality), and results (e.g., a "creative" product). Thus, creativity is treated as both a cause (e.g., creative processes yield products; people's creativity causes them to behave in a certain way) and as an effect or result (a particular kind of product resulting from person and process) (Cropley, 2020).

As referred to by Cropley (2020), creativity in education could involve empowering PSTs to use their knowledge and skills to develop innovative and engaging learning experiences. Furthermore, ICT should play a crucial role in enhancing creativity as a capability by enabling PST to design and include lessons that leverage resources and tools. PST must thus be skilled in accessing and adapting content to deliver curriculum content through various modes, including ICT. As such, PSTs must be trained to navigate and incorporate ICT, such as digital media and educational platforms. Bladergroen et al. (2018) indicate that critical thinking, independent development and effective communication can be stimulated and brought about by using and integrating ICT.

The CA emphasises enabling individuals to achieve the lives they value through expanded opportunities, thus supporting the use of ICT in the training of PST. Using ICT to creativity as a capability will provide PST with autonomy to develop personalised learning experiences and thus exercise professional agency. This will assist PSTs to deliver the curriculum in diverse ways to cater to varied learners' needs. According to Mahlo and Waghid (2023), teachers' innovative use ICTs helps create an inclusive learning environment where learners learn differently. As such, PST should be encouraged to explore how the creative use of Technology can make learning and teaching more interactive and collaborative. According to Langeveld and Pietersen (2024), using technology in teaching and learning provides alternative learning experiences and promotes interaction.

The implication for HEI is that PST should be exposed to online platforms where they are engaged in exploring the creative uses of ICT. The challenge identified in the analyses of the stipulation with creativity as a capability for ICT is that access to ICT remains a challenge in SA, particularly in under-resourced schools. Not all PSTs have equal access to ICT in the schools they have attended and will teach, which could limit their ability to integrate technology into teaching. Many teachers' education programmes may not adequately prepare PSTs to use technology in diverse educational contexts creatively.

However, some PSTs may be hesitant to embrace ICT as a tool for creativity. Addressing systemic barriers, enhancing institutional support, and fostering innovative teaching practices are essential to developing adaptable and competent educators. By embedding digital skills into teacher education programs, institutions can empower pre-service teachers to navigate the evolving education landscape and contribute meaningfully to diverse and dynamic learning environments.

4.3 Collaboration as an IT capability

Collaboration is a dynamic process influenced by multiple factors, including curriculum requirements, educational policies, and pre-service teachers' diverse dispositions and beliefs about teaching and learning (Hattie, 2012). The importance of collaborative opportunities in teacher education programs is highlighted to foster a critical understanding of IT integration and develop the leadership skills required to address 21st-century classroom needs (Caliskan, 2020). Collaboration was identified as a vital mechanism for bridging the gap between theoretical learning and practical application in teacher training institutions.

MRTEQ (2015) stipulates that "*newly qualified teachers must critically reflect, be informed by theory, and collaborate with professional colleagues to improve and adapt their teaching practices continuously.*" Reflective practice is essential for professional growth, enabling teachers to assess their instructional strategies' effectiveness, identify improvement areas, and make evidence-based adjustments (Connoly et al., 2020). Using theoretical perspectives, such as Kolb's (1984) experiential learning cycle, helps teachers systematically analyse their experiences and refine their pedagogical approaches.

Collaboration within professional learning communities fosters shared knowledge, collective problem-solving, and ongoing professional development (Lave & Wenger, 1991). Without critical reflection, teachers risk stagnation and may struggle to respond effectively to the evolving needs of learners and educational contexts (Brookfield, 2017). Thus, reflective practice, grounded in theory and collegial engagement, is vital to teacher professionalism and continuous learning (DHET, 2015).

As a result, collaboration emerged as a key enabler for IT capability development in teacher education programs. Pre-service teachers reported that group-based projects and professional learning communities (PLCs) provided valuable opportunities to engage with peers, share knowledge, and develop practical IT skills. These collaborative activities aligned with Jappie's (2021) assertion that higher education institutions should create environments that promote shared learning and teaching opportunities. Integrating ICT into collaborative learning environments enhanced pre-service teachers' ability to use technology effectively in future classrooms. The importance of structured opportunities to work together using digital platforms, tools, and simulations should be emphasised. This is supported by Chai et al.'s (2010) view that technology education must include collaborative activities to enhance instructional quality and technical ability.

PLCs were identified as effective strategies for promoting collaboration and IT capability development. PLCs foster a supportive environment for discussing challenges and sharing strategies for integrating IT into teaching. This finding underscores the potential of PLCs to bridge the gap between theoretical understanding and practical application, as Buerkle et al. (2023) advocated. Furthermore, partnerships between teacher education institutions and schools play a significant role in enhancing collaboration. These partnerships provide opportunities for pre-service teachers to work collaboratively with in-service

teachers, gaining real-world experience in IT integration. This approach aligns with the MRTEQ (2015), which emphasises the importance of connecting theory with practice to address diversity and transformation in education (DHET, 2015).

Despite the benefits of collaboration, there are several barriers, including infrastructure deficits, limited access to technology, and insufficient time allocated for collaborative activities. Addressing these challenges requires systemic interventions, such as increased investments in digital resources and developing policies prioritising collaborative learning. Collaboration was found to foster pedagogical innovation by encouraging pre-service teachers to experiment with student-centred learning approaches. As such, working in groups allows the exploration of diverse perspectives and the development of creative strategies for integrating IT into instruction. This finding aligns with DHET (2015), highlighting the importance of ICT competencies in fostering innovative teaching practices.

The capabilities outlined above should not been seen as a definite blueprint of suggestions concerning MRTEQ policy. The importance of these suggested capabilities is contained in the notion of the CA that the opportunities a person has, either to be or to do certain things, represent the opportunity to achieve valuable combinations of human functionings (Robeyns, 2005). A study by Jita (2016) in SA revealed that PSTs are more familiar and comfortable with non-technology-related skills than technology-oriented ones. Marongwe and Chisango (2023) indicate that the lack of ICT training opportunities provided to PSTs contributes to the incompetence of initial teachers in utilising ICTs. Thus, if PSTs are not appropriately prepared and are unable to adapt to the changing educational landscape, the endeavour to provide equitable access to quality education for all may fall short. As a result, it is essential for PSTs to develop practical skills to thrive in twenty-first-century environments (Lane et al., 2015).

Adaptability as an identified capability aims to strengthen PSTs' digital competencies, ensuring they can navigate the ever-evolving technological landscape. In line with the CA, adaptability expands teachers' real opportunities (capabilities) by equipping them with the flexibility to engage with new digital tools, transition between different learning environments, and modify their teaching methods to meet diverse student needs (Robeyns, 2017). Adaptability is particularly important in education, where technological advancements, policy changes, and unexpected disruptions (such as the shift to online learning during crises) require teachers to adjust their pedagogical approaches swiftly and effectively.

Through adaptability, PSTs can shape their professional practices to enhance their teaching and student learning outcomes. Integrating creativity into IT training for PSTs aligns with the CA, emphasising expanding individuals' opportunities to achieve valued outcomes (Nussbaum, 2011; Sen, 1999). Creativity, as conceptualised through Cropley's (2020), enhances PSTs' agency in designing meaningful and innovative digital learning experiences. By fostering creative thinking, PSTs gain the capability to use technology not just as a tool but to enrich student learning in diverse and contextually relevant ways. This aligns with the

CA's focus on empowering individuals with the freedom to act and innovate within their professional environments (Walker & Unterhalter, 2007).

Collaboration further reinforces IT training by enhancing PSTs' ability to navigate challenges and work collectively to improve educational practices. Collaborative learning environments, supported by professional learning communities and school partnerships, enhance pre-service teachers' ability to integrate technology into teaching. However, addressing systemic barriers, such as infrastructure challenges, remains essential to maximising the potential of collaboration in IT capability development. By fostering collaborative practices, teacher education programs can better prepare PSTs to meet the complexities of the modern classroom. Collaboration, in turn, aligns with the social dimension of the CA, as it supports shared learning, teamwork, and collective knowledge-building (Walker, 2006).

By embedding creativity, adaptability, and collaboration within IT training, PSTs are equipped with the agency and opportunities to function effectively in digitally enriched educational environments, ultimately broadening their professional capabilities in transformative ways.

5. Conclusion

This study aimed to understand how MRTEQ's (2015) policy understands the role of ICT in pre-service teacher training and the ICT competencies it advocates in South African Universities. The identification of stipulations from MRTEQ (2015) contributed to the identified competencies: adaptability, creativity, and collaboration. In this light, we believe the identified capabilities are relevant, as MRTEQ (2015) indicates, and essential for pre-service teacher education. By empowering PSTs with skills to use digital tools innovatively, HEI can assist them in designing engaging, contextually relevant learning experiences. However, it is vital to be aware of the digital divide, insufficient training, and resistance to change that may impede the effectiveness of the ICT competencies of PST.

This paper supports earlier findings of Bladergroen and Chigona (2019) that highly motivated attitudes towards ICT can be developed and that it is the responsibility of teacher training institutions to equip pre-service teachers with management skills to use and integrate ICT in the classroom. Our paper finds that MRTEQ (2015) encourages the development of ICT competencies and that the identified capabilities can enrich the well-being of PST. MRTEQ (2015), however, is not clear in terms of setting national standards for digital literacy for PSTs. We recommend that all teacher education programmes be required to offer compulsory modules on ICT-integrated pedagogy. These should be given specific attention to challenges in low-resource environments, which all relevant Higher Education stakeholders should guide.

This study provided significant insights into how the recommended capabilities could be applied as derived from MRTEQ (2015). The effective application of the capabilities could empower the PST to realise that they should be making informed decisions about the management of ICT in their learning and teaching,

and that it becomes the responsibility of HEIs to provide the necessary training. This study indicated the implications of the identified capabilities and recommendations for HEI namely that 1) sustained investment in technological resources and support systems within teacher education institutions, 2) embedding digital skills into teacher education programs, institutions to empower pre-service teachers to navigate the evolving landscape and 3) collaborative environments should be supported by professional learning communities and partnerships.

Future research can empirically follow the development of ICT capabilities in pre-service teachers over their undergraduate journey, using mixed methods and capability mapping frameworks, as this study was limited to a conceptual outlook. Furthermore, an important avenue for further research may be a quantitative study that tests the identified capabilities and views of the PST in terms of what MRTEQ (2015) advocates. This can be complemented by action research capturing PTS's narratives about their training experiences particularly regarding adaptability, creativity, and collaboration.

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