

PRE-SERVICE TEACHERS' PERCEPTIONS AND EXPERIENCES OF USING SMARTBOARDS TO PROMOTE ACTIVE LEARNING DURING TEACHING PRACTICE

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Abstract

This study explored pre-service teachers' perceptions and experiences of using smartboards to promote active learning in South African classrooms during teaching practice. Grounded in Mayer's Cognitive Theory of Multimedia Learning (CTML), the research employed a qualitative design, and semi-structured interviews were administered to five final/fourth-year PSTs at a South African university, who had completed 20 weeks teaching practice over the four years of B.Ed. programme. Findings were analysed using thematic analysis. Findings revealed that participants held positive perceptions of smartboards' potential to foster engagement, collaboration, and differentiated instruction. However, most participants reported feeling inadequately prepared to use smartboards effectively in their teaching practice. Limited training, insufficient hands-on experience during their teacher education programme, and inadequate mentorship during teaching practice were identified as key factors contributing to this lack of preparedness. In addition, participants highlighted several contextual challenges that constrained effective implementation, including technical difficulties, limited access to functioning equipment, lack of technical support, and time constraints within lessons. The study recommends enhancing teacher training curricula to include pedagogically focused, hands-on smartboard teaching and stronger school-university collaboration. This will better equip future teachers to implement smartboard-supported teaching and learning strategies confidently and effectively.

Keywords: *Smartboards, pre-service teachers, active learning, teaching practice, multimedia learning.*

1. Introduction

Education systems worldwide are undergoing significant transformation in response to rapid technological advancement, changing labour market demands, and the evolving characteristics of contemporary learners. These shifts are often associated with the Fourth Industrial Revolution (4IR), which is characterised by digitalisation, automation, artificial intelligence, and increased reliance on technological competencies (Schwab, 2018). As a result, schools are increasingly expected to prepare learners with skills such as critical thinking, collaboration, communication, creativity, and digital literacy. Within this context, teaching approaches that rely solely on traditional teacher-centred methods are increasingly viewed as insufficient for preparing learners for participation in knowledge-based societies (Matemera, 2020). According to De Silva et al. (2016) contemporary learners are described as digital natives because they have grown up interacting with digital devices such as smartphones, tablets, and computers, and therefore often demonstrate familiarity with technology-mediated environments. These learners generally expect more interactive, visual, and participatory learning experiences than previous generations (ibid). Consequently, education systems have increasingly adopted Information and Communication Technologies (ICTs) to align classroom practices with learners' needs and expectations. In South Africa, this commitment is reflected in policy frameworks such as White Paper 7 on e-Education and the Curriculum and Assessment Policy Statement (CAPS), both of which encourage the meaningful integration of ICTs into teaching and learning (Department of Education [DoE], 2004; Department of Basic Education [DBE], 2011). Such policy directions recognise that technology can enhance teaching and learning and enable learners to develop competencies required in the 21st century.

Among the technologies introduced into schools are smartboards, also widely known as interactive whiteboards. A smartboard is a large touch-sensitive digital display connected to a computer and projector, allowing users to control applications directly on the board using touch or a stylus (Alshaikhi, 2017). Unlike conventional chalkboards or whiteboards, smartboards integrate multimedia functions such as videos, simulations, animations, internet access, writing tools, and interactive tasks into one platform (Alfaki, 2014). These affordances make them particularly valuable in supporting visualisation, learner participation, and multimodal teaching and learning. Researchers have shown that smartboards can make lessons more engaging, especially when teaching abstract or complex concepts, by presenting content dynamically and interactively (Mihai, 2020; Mkhwebane et al., 2025). The pedagogical value of smartboards is strongly linked to the concept of active learning. Active learning refers to instructional approaches in which learners participate meaningfully in the learning process through discussion, problem-solving, collaboration, inquiry, reflection, and interaction with learning (Bean & Melzer, 2021). Bakadam et al., 2012 and Bozzo et al., 2015 asserted that smartboards can support active learning by enabling learners to manipulate digital objects, participate in quizzes, analyse diagrams, solve problems collaboratively, and engage with multimedia content in real time. Through these functions, smartboards can shift classroom practice from passive transmission of knowledge to more learner-centred pedagogies as both the teacher and learners co-construct knowledge through the smartboard.

In South Africa, several provincial departments introduced smartboards into public schools as part of broader digitalisation agendas. For example, the Gauteng Department of Education (GDE) invested in tablets, laptops, and smartboards to modernise classrooms and reduce historical inequalities in access to educational resources (Matemera, 2020). Such initiatives suggest growing opportunities for teachers and learners to engage with digital teaching tools. However, the meaningful integration of smartboards depends not only on infrastructure, but also on teachers' competence, confidence, and pedagogical readiness to use them effectively. This concern is particularly important in the preparation of pre-service teachers (PSTs). Mavuru and Pila (2021) highlighted that during initial teacher education programme, PSTs are expected to develop the knowledge, skills, and dispositions required for effective classroom practice. One of the most important components of this preparation is teaching practice. Mokoena (2017) defined teaching practice as the supervised period during which PSTs are placed in schools to teach real learners, apply theory to practice, and develop professional competence in authentic classroom contexts. It is widely regarded as a critical bridge between university coursework or theoretical knowledge and the realities of school teaching.

Despite the increasing availability of smartboards in schools, international and South African studies indicate that many PSTs feel underprepared to integrate digital technologies effectively during teaching and learning (Alshaiki, 2014; Mavuru & Pila, 2021; Mihai, 2020). Common challenges include inadequate training at university, limited opportunities for hands-on practice during microteaching sessions, lack of access to functioning smartboards during school placements, and insufficient mentorship from teachers who may themselves lack confidence or expertise in using the technology (Mavuru & Pila, 2021; Mihai, 2020). In some cases, PSTs are placed in schools where smartboards exist but are underutilised, poorly maintained, or inaccessible (Mihai, 2020). Additional barriers include technical faults, poor internet connectivity, malfunctioning equipment, load shedding, time limitations during lessons, and inadequate technical support from schools or departments (Mkhwebane & Mbanze, 2026; Tefo, 2020).

The persistence of these challenges presents a significant concern for initial teacher education in South Africa. Although national policies and provincial investments continue to promote digital teaching, many PSTs may complete their training without the competence and confidence to integrate smartboards meaningfully in classroom practice (Mihai, 2020). This reflects a disconnect between policy intentions, available infrastructure, and teacher preparedness. As noted by Mavuru and Pila (2021), insufficient preparation during teacher education limits the capacity of future teachers to use technology for learner engagement and active learning. In turn, this may reinforce traditional teacher-centred pedagogies that are increasingly misaligned with the needs of contemporary learners and the demands of the 4IR (Mihai, 2020). It is therefore necessary to examine how PSTs perceive and experience the use of smartboards during teaching practice.

2. Theoretical frameworks

This study was guided by Mayer's Cognitive Theory of Multimedia Learning (CTML), which explains that learners understand more effectively when information is presented through both verbal and visual forms (Mayer, 1997). According to Mayer (2024) CTML is grounded in three principles: dual channels, where learners process visual and verbal information separately; limited capacity, where each channel can handle only a small amount of information at one time; and active processing, where learners construct meaning by selecting, organising, and integrating information with prior knowledge. CTML aligns with the use of smartboards because these tools combine text, images, audio, video, diagrams, and

interactive features in one platform (Mkhwebane & Mbanze, 2026). Furthermore, Mkhwebane et al., (2025) posited that such multimodal presentation can enhance attention, comprehension, and engagement, particularly when teaching complex concepts. CTML therefore provided a useful lens for examining pre-service teachers' perceptions and experiences of using smartboards to promote active learning during teaching practice.

3. Research methodology

This study adopted a qualitative phenomenological case study design (Creswell & Creswell, 2018) to explore PSTs' perceptions and lived experiences of using smartboards to promote active learning during teaching practice in South African classrooms. The design enabled the researchers to capturing participants' meanings, reflections, and challenges regarding smartboard use during teaching practice.

Through purposive sampling (Cohen et al., 2017), five final/fourth-year Bachelor of Education (B.Ed.) PSTs were selected from a South African university. Participants were selected because they had completed a cumulative 20 weeks of teaching practice across the four years of the B.Ed. programme and had exposure to smartboards during school placement. Their recent and direct experiences positioned them to provide rich insights into the realities of smartboard integration in classrooms.

Data were collected through semi-structured individual interviews conducted online via Microsoft Teams at times convenient and mutually agreed upon by the researchers and participants. With participants' consent, all interviews were audio-recorded for accuracy and lasted between 30 and 45 minutes. The interview schedule focused on participants' perceptions of smartboards for promoting active learning, their preparedness to smartboards, the support received during teaching practice, and challenges encountered in schools.

Data were analysed thematically using Braun and Clarke's (2006) six-step framework: familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Thematic analysis enabled the identification of recurring patterns related to preparedness, perceptions, opportunities, and barriers to effective smartboard use during teaching practice.

Trustworthiness was ensured through credibility, dependability, confirmability, and transferability. Ethical principles were strictly observed throughout the study. Participation was voluntary, informed consent was obtained from all participants prior to data collection, and anonymity was maintained using pseudonyms to protect identities and confidentiality. An ethical clearance certificate (Sem 1-2025-043) was sought and obtained from the Faculty of Education Research Ethics Committee before commencing with data collection.

4. Research findings

The study found that pre-service teachers perceive smartboards as potent tools that can significantly enhance active learning by increasing student engagement, fostering collaboration, and supporting. Lerato expressed that "smartboards allow me to use pictures and videos so learners can visualize landforms and interact with content," illustrating how multimodal representation supports learners in making sense of abstract geographical concepts. This resonates with CTML, particularly the dual-channel and active processing principles, which argue that learners construct meaning more effectively when visual and verbal information are integrated and actively processed (Mayer, 2024).

Similarly, Ratanang noted that "videos and pictures help learners who dislike writing," underlining the role of visual and multimodal resources in accommodating diverse learner preferences. This reflects broader shifts in education systems that recognise contemporary learners as digital natives who prefer interactive, visual, and technology-mediated learning environments (De Silva et al., 2016). Ratanang's observation suggests that smartboards can support inclusive pedagogical approaches by providing multiple entry points to learning, particularly for learners who struggle with traditional text-heavy instruction.

Siboniso shared that "gamification through tools like Kahoot on IWBs makes learners want to retry even after wrong answers," directly linking interactive features of smartboards to increased motivation and sustained engagement. This aligns with literature that positions smartboards as tools that support active learning through quizzes, problem-solving, and real-time interaction (Bozzo et al., 2015). In this way, learners are not only exposed to content but are also actively engaged in iterative learning processes, where feedback and participation reinforce understanding. This reflects the broader pedagogical shift away from teacher-centred approaches towards learner-centred environments.

However, despite these positive perceptions, all participants reported feeling generally underprepared to fully utilise the capabilities of smartboards. For instance, Ratanang stated, “I’m prepared but limited by basic IWB features,” and noted that “training was mostly independent learning through YouTube,” bringing to light a significant gap between policy expectations and actual teacher preparation. Although national and provincial policies encourage ICT integration, (Matemera, 2020), the findings suggest that teacher education programme does not consistently provide structured, hands-on training on smartboard pedagogy. This supports existing concerns that pre-service teachers often enter teaching practice without sufficient competence or confidence to integrate technology meaningfully (Mavuru & Pila, 2021; Mihai, 2020).

Michael explained that he “can use IWBs for slides and gamification but has not explored their full capabilities due to lack of training,” which reflects the limited pedagogical depth of ICT integration. This aligns with findings that PSTs often develop basic operational skills but lack deeper pedagogical integration aligned with learner-centred teaching approaches (Mihai, 2020). This limitation reduces the potential for optimal multimedia learning, as effective use of smartboards requires intentional design that supports dual-channel processing and active cognitive engagement.

Mentorship emerged as another significant factor shaping PSTs’ experiences. Siboniso noted that “older teachers tend to use IWBs just to display textbooks, not actively integrating them into lessons,” and that “mentors often reinforced traditional methods,” highlighting how school-based mentorship can either enable or constrain innovation. This finding reflects concerns in the literature that PSTs’ experiences during teaching practice are heavily influenced by the practices of mentor teachers, particularly when mentors themselves lack confidence in ICT integration (Mavuru & Pila, 2021).

Lerato observed that her mentor “rarely used IWBs, only to insert a USB,” which restricted her exposure to interactive applications. This suggests a misalignment between the intended pedagogical affordances of smartboards and their actual classroom use. Although smartboards are designed to support multimodal learning, collaboration, and learner interaction (Alfaki, 2014), their underutilisation reinforces transmissive teaching approaches.

Contextual challenges further compounded these limitations. Participants cited frequent power outages, poor internet connectivity, and outdated or malfunctioning equipment. Michael explained that “when there are power cuts, I revert to handouts or draw diagrams manually,” illustrating how infrastructural instability disrupts continuity in technology-enhanced learning. These challenges are consistent with broader South African studies that identify load shedding, technical faults, and limited support as persistent barriers to ICT integration in schools (Mkhwebane & Mbanze, 2026; Tefo, 2020). Such conditions not only hinder lesson delivery but also discourage experimentation with innovative pedagogies, thereby reinforcing reliance on traditional teaching methods.

In terms of support needs, participants called for comprehensive training programs—both technical and pedagogical—along with improved infrastructural resources. Lerato emphasized the need for “training on the board’s features to effectively integrate them into lessons,” highlighting that technical competence is a prerequisite for meaningful use. Siboniso stressed the importance of “pedagogical guidance on how to design active learning strategies with IWBs.” Ratanang advocated for “workshops and departmental involvement to better prepare teachers.”

5. Implications, recommendations and conclusions

The study found that pre-service teachers perceive smartboards as valuable tools for promoting active learning through enhanced engagement, collaboration, and differentiated instruction. They highlighted the benefits of multimedia features and gamification in supporting learner understanding and participation. However, their use of smartboards remains largely basic due to inadequate formal training, limited pedagogical support, poor mentorship, and infrastructural challenges such as power outages and poor connectivity, which restrict meaningful integration into teaching practice.

The main limitation of the study is the small, single-institution sample of five PSTs, which limits the broader applicability of the findings. In addition, the study captured only PST perspectives, excluding mentor teachers and learners, which could have provided a more comprehensive view of smartboard use in classrooms.

The findings point to the need to strengthen teacher education programmes by integrating both technical and pedagogical training on smartboard use, supported by improved mentorship and modelling of interactive practices during teaching practice. Future research should expand to multiple institutions and include mentor teachers and learners to deepen understanding of digital pedagogy in practice.

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