
**PRIMARY SCHOOL EDUCATOR'S ATTITUDES TO CLASSROOM TECHNOLOGY ADOPTION
AND USE IN SOUTH AFRICA**

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Orcid:<https://orcid.org/0009-0000-9274-7280>Email:ghsprincipal@glenvistahigh.co.a**ABSTRACT**

This study explores technology integration in South African primary education, centring on educators' attitudes, beliefs, competencies, policies and systematic factors. Theoretical lenses reviewed include the Technology Acceptance Model (TAM), UTAUT, diffusion of innovation and TPACK, highlights how teacher self-efficacy, perceived usefulness, ease of use, infrastructure, leadership, policy, and professional development influence classroom technology adoption. Although national policies promote digital transformation, implementation remains uneven because of socioeconomic inequalities, infrastructure deficits, limited training opportunities, and contextual constraints. Evidence suggests that positive attitudes alone are insufficient for sustained technology use; successful integration requires supportive school leadership, relevant professional learning, reliable resources, and context-sensitive policy implementation. Emerging technologies, including artificial intelligence and digital learning platforms, offer opportunities to enhance teaching, assessment, inclusion, and learner engagement, but they also raise ethical, privacy, and equity concerns. The researcher concludes that meaningful technology integration depends on aligning infrastructure, teacher development, leadership support, and community realities to enable sustainable pedagogical change. Methodological approaches span surveys, grounded theory, mixed method, structural equation modelling and empowerment evaluation. Policy and practice recommendations call for integrated investment in devices, connectivity, on-going professional development that links technological, pedagogical and content knowledge. The measures aim to convert positive intentions into sustained pedagogical practice within local constraints.

Keywords: *Infrastructure, Attitudes, Technology, Implementation, Professional Development*

1 INTRODUCTION

Technology has become a central feature of educational reform worldwide. In South Africa, technology is frequently presented as a mechanism for improving educational quality, extending learning opportunities, and addressing historical inequalities. Despite these ambitions, classroom technology adoption remains uneven. Educators often work in environments characterised by limited infrastructure, competing priorities, and significant social challenges. This manuscript examines how primary school educators perceive technology and how those perceptions influence adoption and classroom use. Research consistently demonstrates that attitudes are important predictors of technology integration. Teachers who perceive technology as useful and manageable are more likely to incorporate digital tools into instruction, they stress the need to embedded digital tools within structured teaching and learning activities to improve instructional quality and learner outcomes (Ohei, 2023). Analyses of Kenyan and South African initiatives show that having all resources at hand does not translate into integration because factors such as beliefs, skills school leadership shape everyday classroom use (Wambiri & Ndini., Mapisa & Makenaa, 2024). However, attitudes are shaped by broader contextual realities including access to resources, institutional support, policy implementation, workload pressures, and professional learning opportunities. Consequently, understanding educator attitudes requires attention to both individual and systemic influences (Torres & Giddie, 2020). The South African context is particularly significant because schools operate across highly diverse socioeconomic conditions. Some institutions possess advanced digital infrastructure, whereas others continue to struggle with basic necessities such as electricity, connectivity, and secure facilities (Torres &Giddie, 2020). These disparities influence both opportunities and constraints for technology use. The review therefore explores the interaction between educator beliefs, school environments, policy frameworks, and emerging technological developments.

2 THEORETICAL FRAMEWORK AND CONCEPTUAL FOUNDATIONS

Adoption theory examines the individual and the choices an individual makes to accept or reject a particular innovation (Straub, 2009). Teacher attitudes, technology acceptance theories, and innovation frameworks provide important lenses for understanding technology integration. Technology Acceptance Model (Davis, 1989) and Unified Theory of Acceptance and Use of Technology research (Momani, 2020)

consistently identifies perceived usefulness, ease of use, social influence, and facilitating conditions as major determinants of adoption. Educators who believe technology improves teaching outcomes are more likely to use it, while confidence, training, and support influence perceptions of ease of use. According to the study of Eden, Onyebushi & Adeniyi (2024), educational technology integration extends beyond device availability. Meaningful adoption involves aligning technology with curriculum goals, pedagogy, assessment practices, and learner needs. Technology therefore functions not merely as an instructional aid but as a catalyst for pedagogical transformation. Innovation theories further emphasise that adoption is a gradual process requiring organisational readiness, leadership support, and professional learning. Change processes in schools are often complex because teachers must balance innovation with existing responsibilities. Successful adoption occurs when educators perceive technology as compatible with their teaching values and practical realities (Liang, Wong & Holdworth, 2022). Resistance frequently emerges when technologies are introduced without adequate consultation, training, or contextual adaptation. These theoretical perspectives collectively highlight the importance of attitudes, beliefs, organisational culture, and contextual factors in shaping technology use. This study explores and analyses primary school educator's attitudes to classroom technology adoption and use in South Africa

Q1. How do primary school educators perceive the potential of integrating technology in their classrooms, perceive the potential and challenges of using technology?

Q2. What strategies and leadership support do educators require to integrate ICT into their classrooms?

3 LITERATURE REVIEW

South African Educational Context

South Africa's policy environment strongly supports digital learning. National initiatives have promoted ICT integration, digital literacy, and technology-enhanced teaching supported by the National Digital and Future Skills (2021) & National Integrated ICT Policy White Paper, (2016)). Nevertheless, implementation remains uneven across provinces and school contexts. Infrastructure shortages, inconsistent connectivity, and funding constraints continue to limit progress in many schools. Socioeconomic inequalities significantly influence technology access. Rural and lower-income communities frequently experience limited internet access, unreliable electricity, inadequate security, and insufficient equipment. Such conditions affect both educators and learners, reducing opportunities for regular technology engagement. Consequently, policy aspirations are often difficult to translate into everyday classroom practice. South African classrooms are also characterised by linguistic and cultural diversity. Technology can support multilingual learning and broaden access to educational resources, yet digital materials are not always available in all languages (Msweli & Ajani 2024). Effective technology integration therefore requires sensitivity to local cultures, languages, and learner experiences. Contextual responsiveness remains essential if technology initiatives are to promote inclusion rather than reinforce existing inequalities (Msweli & Ajani, 2024).

4 PRIMARY SCHOOL EDUCATORS AND PROFESSIONAL PRACTICE

Primary school educators occupy a pivotal role in technology integration. Their daily teaching responsibilities require them to balance curriculum coverage, assessment demands, classroom management, and learner support. Within this environment, technology adoption is influenced by professional identity, workload, and access to resources (Moosa & Ramnarain, 2023., Mavutha & Mansingh, 2024., Maseko & Chigeza 2024). Many educators recognise the potential value of digital technologies for enhancing teaching and learning. However, implementation challenges often include insufficient infrastructure, lack of technical support, and limited opportunities for professional development. Teachers in multigrade and rural settings face particularly demanding circumstances because they must manage diverse learner needs while working with constrained resources.

Digital competence is another important consideration. Educators vary substantially in their confidence and experience with technology. Teachers who possess stronger digital skills generally demonstrate greater willingness to experiment with technology-supported pedagogies (Makalela, 2018). Conversely, limited competence can contribute to anxiety and reluctance. Sustained professional learning is therefore essential for strengthening confidence and supporting effective classroom integration. Everyday technology use emerges from the interaction of personal competence, organisational support, and contextual opportunity rather than from access alone.

5 ATTITUDES TOWARDS ADOPTION AND USE OF TECHNOLOGY

Attitudes toward technology consist of cognitive, affective, and behavioural dimensions. Cognitive beliefs include perceptions of usefulness and ease of use. Teachers are more likely to adopt technology when they

believe it improves instructional effectiveness, learner engagement, and assessment quality. Perceived complexity, on the other hand, can discourage adoption (Quintana-Ordorika et al., 2024). Affective responses such as motivation, enthusiasm, anxiety, and confidence also influence technology use. Positive emotional experiences encourage experimentation and persistence, whereas anxiety may limit engagement. Professional development can play an important role in reducing fear and building confidence by providing structured opportunities to learn and practise new skills. Behavioural intention serves as a key predictor of actual technology use. Studies consistently show that teachers who intend to integrate technology are more likely to do so when adequate support and resources are available. Nevertheless, favourable intentions do not automatically translate into practice. Organisational barriers, infrastructure limitations, and competing responsibilities can weaken the relationship between intention and behaviour. Technology adoption is therefore best understood as a dynamic process shaped by both individual attitudes and contextual realities.

6 KEY FACTORS SHAPING EDUCATORS' ATTITUDES

Individual-level influences include self-efficacy, prior experience, perceived competence, workload, and beliefs about technology (Taole, 2024). Teachers with stronger confidence in their digital abilities generally report more positive attitudes toward technology integration. Conversely, limited skills and previous negative experiences may contribute to resistance or avoidance. School and organizational influences are equally important. Leadership, access to resources, technical support, and institutional culture all affect how educators perceive technology. Principals who communicate a clear vision for technology integration and provide opportunities for professional learning can foster positive attitudes and sustained use. Community and policy influence's further shape educator perceptions. Schools are embedded within broader social environments that affect resource availability, expectations, and priorities. Communities facing poverty and limited infrastructure may regard technology as secondary to more immediate concerns. At the same time, policy frameworks can either support or hinder implementation depending on the clarity of guidance, consistency of support, and alignment with local realities (Wambiri & Ndani 2016). Effective technology integration therefore requires coordinated action across multiple levels of the education system.

7. PERCEIVED PEDAGOGICAL VALUE OF TECHNOLOGY

Educators frequently identify technology as a valuable tool for curriculum delivery, assessment, and learner engagement. Digital resources can provide access to diverse learning materials, support differentiated instruction, and facilitate formative assessment. Emerging technologies such as artificial intelligence further expand opportunities for personalized learning and immediate feedback. Technology can also promote learner-centred pedagogies by encouraging inquiry, collaboration, and active participation (Aghaziarati, Nejatifar & Abedi, 2023). Multimedia resources, simulations, educational games, and interactive platforms create opportunities for richer learning experiences. These approaches may enhance motivation and support deeper understanding of complex concepts. At the same time, pedagogical value depends on thoughtful implementation. Technology is most effective when integrated into sound instructional design rather than used as an isolated add-on. Teachers require both pedagogical and technological knowledge to ensure that digital tools contribute meaningfully to learning outcomes. Evidence therefore suggests that successful integration depends on the alignment of technology, curriculum, pedagogy, and assessment (Aghaziarati, Nejatifar & Abedi, 2023).

8 CHALLENGES AND RISKS ASSOCIATED WITH TECHNOLOGY USE

Technology integration presents several challenges. Infrastructure deficits remain among the most significant barriers, particularly in rural and under-resourced schools (Mavutha & Mansingh, 2024). Limited connectivity, unreliable electricity, insufficient devices, and inadequate maintenance reduce opportunities for sustained technology use. Inclusion is another important concern. While technology can support learners with diverse needs, unequal access may widen educational disparities (Seleke, 2024). Schools must therefore ensure that technology initiatives are designed with equity and accessibility in mind (Maseko & Chigeza, 2024). Ethical considerations have become increasingly prominent. Issues related to privacy, data security, surveillance, digital citizenship, and responsible technology use require careful attention. Emerging technologies such as artificial intelligence raise additional questions regarding transparency, accountability, and bias. Educators need guidance and professional support to navigate these challenges while maintaining safe and ethical learning environments. Research on ICT in the Amathole District a region in South Africa, explicitly identifies disparity in access, teacher readiness and pedagogical use as core features of the regional landscape. These findings are interpreted to mean that ICT can promote educational equity, but only where devices availability, connectivity and relevant digital content are aligned with professional development and local conditions (Mapisa & Makenaa., Nhlumayo, 2024).

9 PROFESSIONAL DEVELOPMENT AND SUPPORT MECHANISMS

Professional development is consistently identified as a critical factor in technology integration. Models of teacher learning for technology integration in South Africa combine structured professional development designs with frameworks that specify the knowledge and beliefs teachers need in order to use ICT meaningfully. Effective programs move beyond basic technical training and focus on the relationship between technology, pedagogy, and curriculum. One prominent orientation draws on the Technological Pedagogical Content Knowledge (TPACK) framework to argue that professional development should deliberately address the interplay of technological, pedagogical and content knowledge, rather than generic ICT skills alone. Professional development activities should be explicitly ICT based, closely related to teacher's curriculum needs, and framed by policies that ensure appropriate learning content and opportunities to translate new knowledge into practice (Ajani & Govender, 2023)

Teachers benefit most when professional learning is sustained, practical, collaborative, and directly relevant to classroom needs. Models of teacher learning increasingly emphasise communities of practice, peer collaboration, mentoring, and reflective inquiry. Such approaches encourage educators to share experiences, solve problems collectively, and develop confidence through ongoing engagement. Leadership plays a central role in supporting professional growth. School leaders who prioritise technology integration can create conditions that encourage experimentation and innovation. Technical support, mentoring structures, and opportunities for collaboration strengthen educators' capacity to integrate technology effectively. Professional development is therefore not a one-time intervention but a continuous process that supports evolving educational needs and technological change.

10 METHODOLOGY

Designing an investigation of educator's attitudes toward technology integration requires alignment between research questions, philosophical positioning and data collection strategies. Research on educator attitudes toward technology employs a range of methodological approaches. Quantitative studies frequently use surveys and technology acceptance frameworks to examine relationships between beliefs, intentions, and behaviour. These approaches provide valuable insights into patterns and predictors of adoption. Qualitative research contributes a deeper understanding of contextual realities by exploring educators' experiences, perceptions, and challenges. Interviews, focus groups, and case studies reveal how social, cultural, and organisational factors shape technology use in specific settings. Mixed-methods approaches combine the strengths of both traditions, enabling researchers to examine statistical trends while also exploring the meanings educators attach to technology. Methodological diversity enriches understanding of technology integration by highlighting the interaction between individual attitudes and broader contextual influences. Such approaches are particularly valuable in complex educational environments characterised by significant diversity and inequality. The researcher adopted the interpretivist perspective, using purposive sampling of schools, semi structured interviews with educators and principals, questionnaires for learners were distributed and collected, and observation to analyze beliefs, assumptions and visible manifestations of school culture through inductive coding within conceptual framework (Eberlein & Wang, 2014).

10.1 Data Collection Strategies

The researcher employed a non-experimental cross-sectional survey with a self-administered paper-based questionnaire to capture learner's and educator's attitudes towards integrating technology in their lessons. The instrument contained demographic items and 13 closed ended questions divided into attitudinal and explanatory categories, each rated on a five-point Likert scale from "strongly disagree" to strongly agree (Makupe & Machaba, 2024). Semi structured questionnaire was distributed via digital platforms, participants first provided informed consent on the opening page before answering items on socio demographic characteristics and target constructs (Tamale et al, 2024). Across these studies, data collection strategies center on carefully designed, psychometrically sound questionnaires, often embedded within mixed methods frameworks that incorporate interviews, focus groups or observation to situate numerical attitudinal data in rich contextual narratives (Wambiri & Ndabi., Makupe & Machaba, 2024., Ge & Mohd Nasir, 2024., Polar et al., 2024).

10.2 Data Analysis and interpretation

Qualitative components of attitude studies draw heavily systematic thematic or content analysis. Qualitative ICT adoption studies in South African districts adopt grounded theory informed content analysis, where interview transcripts are coded to identify patterns in teachers accounts of inadequate infrastructure, shortages of training and restricted access to tools. Identical or closely related responses are grouped

into categories and higher, level themes, with narrative findings reported using illustrative quotations and linked explicitly to research objectives (Mapisa & Makena, 2024). Analytical procedures for studying educator attitudes toward technology integration need to mirror the methodological pluralism used in comparable work on educational technologies. In research on teacher's technology related beliefs, structural equation modelling has been used to test hypothesized paths linking ICT knowledge value and beliefs, availability of professional development and technical assistance, and reported integration practices. High levels of internal consistency allowed estimation of these relations and interpretation of direct and indirect effects within a latent variable framework (Ge & Mohd Nasir, 2024).

11 IMPLICATIONS FOR POLICY AND PRACTICE IN SOUTH AFRICAN PRIMARY EDUCATION

Evidence from South African rural primary schools argue that principals must move from traditional managerial roles toward technological leadership, underpinned by an explicit ICT based vision and strategy for curriculum integration (Makokotlela, 2022., Nhlumayo, 2024). Strategic direction at school level needs to foreground culture, relationships and context. South African analyses report the White Paper on, e Education and related ICT policies have not been successfully implemented, with consequences for teacher's ability to support learners using electronic pedagogy and for learner's opportunities to keep pace with technological learning trends (Makokotlela, 2022). Policy and practice should focus on creating enabling conditions for meaningful technology integration. Infrastructure investments remain essential, particularly in under-resourced schools. However, hardware provision alone is insufficient. Policymakers must ensure that connectivity, maintenance, technical support, and professional development accompany technology initiatives. School leaders should adopt strategic approaches that align technology use with educational goals. Clear vision, collaborative planning, and ongoing support can strengthen teacher confidence and encourage sustainable adoption. Leadership development programmes should therefore include digital leadership competencies. Contextually responsive support is equally important. Technology initiatives must recognise variations in school resources, learner needs, and community circumstances. Flexible approaches are more likely to succeed than uniform implementation models. Future developments involving artificial intelligence, adaptive learning systems, and digital assessment tools offer significant potential, but successful implementation will depend on careful attention to equity, ethics, and teacher preparedness.

12 CONCLUSION

This section summarizes the evidence and implications emerging from a broad review of technology integration in South African primary schooling, highlighting patterns that must inform policy, school practice, and future research if investment in digital tools, are to translate into improved teaching and learning. Evidence reviewed demonstrates that educator attitudes play a central role in technology adoption and classroom use. Positive beliefs about usefulness, confidence in digital competence, and supportive organisational environments contribute to successful integration. However, attitudes are shaped by broader contextual factors including infrastructure, leadership, professional development, policy implementation, and community conditions. Across studies, availability of devices and connectivity repeatedly appears insufficient by itself. Teacher's beliefs about usefulness and ease of use, their self-efficacy with digital tools, and the normative expectations established by colleagues and school leaders consistently shape intentions to adopt technology. Technology integration in South African primary education remains constrained by persistent inequalities and resource limitations. Nevertheless, educators generally recognise the potential value of technology for enhancing teaching, learning, assessment, and inclusion. Sustainable progress requires coordinated investment in infrastructure, professional learning, leadership development, and contextual support. Emerging technologies offer important opportunities for educational innovation, but they also introduce new ethical, privacy, and equity considerations. Policymakers, school leaders, and educators must therefore pursue balanced approaches that combine technological advancement with careful attention to pedagogical quality and social justice. Meaningful technology integration will be achieved not through devices alone but through the development of supportive systems that enable educators to translate positive attitudes into effective classroom practice.

13. RECOMMENDATIONS

Recommendations are firstly establishing common public ICT training centers across basic, secondary education, expanding ICT focused teacher preparation institutions and ensuring fully operational computerized libraries with internet connectivity in all schools regardless of geographic situation.

Provide learners with educationally constrained ICT tools aligned to curricula and supervised online learning environments for rural communities with free internet access. Funding of schools should be geared towards rural schools for ongoing application of ICT policies, with blended learning advanced as

an appropriate instructional strategy when such systematic supports are in place. Such recommendations directly respond to the document gaps in devices, connectivity and content, and position equitable access as a necessary condition for meaningful expansion of digital opportunities.

All educators to be assessed to determine their ICT related needs, the one size fits all program is rejected as misaligned with diverse classroom contexts.

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