

# The Effectiveness of Integrating Digital Technologies for Inclusive Learning Environments: A Systematic Review of South African Township Schools

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## Abstract

This qualitative study explores the integration of digital technologies, content knowledge, and pedagogy within South African public schools, acknowledging the need for inclusive education and diverse learning styles. Framed by the TPACK framework, the research examines how these three elements can be combined to foster inclusive learning environments. The study adopts an interpretivist paradigm and utilizes a systematic review of secondary data from Scopus, Web of Science, and ScienceDirect to provide a comprehensive analysis of existing research. Contextual analysis demonstrates that while multiple barriers to inclusive education persist, teacher digital illiteracy is the most significant, compounding other difficulties. A review of South African articles suggests that recent integrations of digital technologies and inclusive education have played a vital role in enhancing learner experiences and promoting effective learning.

**Keywords:** inclusive education, digital technology integration, technology pedagogies, inclusive learning environment

## Introduction

It is fascinating how unique each learner truly is. The way individuals best absorb, and process information varies considerably. Some thrive in the dynamic environment of group study, bouncing ideas off peers and constructing knowledge collaboratively. Others find their focus and understanding deepen through solitary exploration, allowing for personal reflection and pacing. Beyond these social preferences, our senses also play a vital role. Some grasp concepts most effectively through visual aids, like diagrams and videos. Others connect with auditory input, such as lectures and discussions. Still others learn best through kinaesthetic experiences, engaging their bodies and hands in the learning process (Oladele, 2024).

Considering this rich tapestry of learning styles is fundamental to the principles of inclusive education. This approach goes beyond simply acknowledging differences; it actively seeks to create learning environments where all students can flourish. As UNICEF (2021) so rightly emphasizes, the goal is to provide genuine and equitable learning opportunities for everyone, ensuring that factors like disability or socio-economic background do not become barriers to accessing quality education.

In this pursuit of inclusivity, digital technology emerges as a powerful ally. Digital technology integration in education refers to the seamless incorporation of digital tools and resources into various aspects of the teaching and learning process (Haleem, et al., 2022). It goes beyond simply using technology as a supplementary tool; rather, it involves a fundamental shift in how educators design and deliver instruction, and how students engage with and demonstrate their learning. Effective digital technology integration aims to enhance the learning experience, improve student outcomes, and equip students with the skills they need to thrive in a digital age.

It offers an unprecedented array of tools and resources that can be tailored to address this very diversity of learning styles. Imagine interactive simulations for kinaesthetic learners, captioned videos and text-to-speech functionalities for auditory and visual learners, and collaborative online platforms for those who excel in group settings. The potential of digital technology to personalize learning experiences and create truly inclusive classrooms is immense, promising a future where every learner can engage, participate, and succeed.

## Problem Statement

Teacher digital literacy remains a significant obstacle, impeding the effective integration of technology into educational practices and hindering inclusive teaching. Research has consistently highlighted gaps in teachers' digital skills, a challenge underscored by studies such as those by Ndibalema (2025) and Geddy, et al. (2020). This deficiency became particularly evident during the COVID-19 pandemic, which compelled South African schools to transition abruptly to virtual instruction. For many educators, this shift was profoundly difficult due

to a lack of preparedness and inadequate digital competencies. The pandemic not only exposed pre-existing disparities but also exacerbated the urgent need for enhanced teacher digital literacy. As schools were forced to close and adopt online learning, many teachers found themselves ill-equipped to navigate the demands of virtual classrooms, utilize digital platforms, and create engaging online learning experiences (Kaeane & Molokomme, 2025). This lack of proficiency extended beyond basic computer skills to encompass a broader range of competencies, including the ability to design effective online pedagogy, select and evaluate digital resources, and provide meaningful online feedback and assessment.

The challenges faced by South African teachers are multifaceted. Systemic issues such as inadequate infrastructure, limited access to technology in schools and homes, and insufficient professional development opportunities have contributed to the digital divide among educators. Furthermore, disparities in digital literacy often mirror broader socio-economic inequalities, disproportionately affecting teachers in under-resourced communities. The long-term implications of these challenges are substantial. Without adequate digital literacy, teachers may struggle to effectively use technology to support student learning, potentially widening achievement gaps and hindering efforts to promote inclusive education. In an increasingly digital world, equipping teachers with the necessary skills is not merely a matter of professional development; it is a fundamental requirement for ensuring equitable access to quality education and preparing students for the demands of the 21st century.

### Aim of the study

This study aims to highlight the critical challenge of inadequate teacher digital literacy within the educational landscape, emphasizing how this deficiency significantly hinders the effective integration of technology into teaching practices and impairs educators' ability to create inclusive learning environments. The investigation also examines how the COVID-19 pandemic brought these longstanding issues into sharp focus, as the sudden shift to remote learning revealed widespread teacher unpreparedness and the severe difficulties many faced due to limited digital competencies. By reflecting on this period, the study underscores the urgent need for comprehensive digital literacy among teachers—extending beyond basic technical skills to include pedagogical integration, resource evaluation, and online assessment strategies. Ultimately, the research argues that closing the digital literacy gap is not merely a matter of professional development, but a fundamental requirement for equitable, quality education and for preparing learners to thrive in an increasingly digital world.

**Main research question:** To what extent and in what ways does the integration of digital technologies impact the creation of inclusive learning environments within the context of South African public township secondary school practices?

### Research sub-questions:

**SQ1:** How are digital technologies currently being integrated into teaching and learning practices in South African public township secondary schools?

**SQ2:** What are the perceived challenges of using digital technologies to promote inclusivity in these school settings, as experienced by teachers, learners, and school administrators?

**SQ3:** What are the perceived benefits of using digital technologies to promote inclusivity in these school settings, as experienced by teachers, learners, and school administrators?

### Significance of the study

This study carries significant implications for learners, schools, and the Department of Education in South Africa. For learners, it highlights the critical link between teacher digital literacy and their ability to access and benefit from technology-enhanced learning, emphasizing the need for teachers to design engaging online experiences and provide effective feedback. For schools, the research underscores the necessity of prioritizing and investing in teacher digital literacy to effectively implement technology, especially during crises, and to develop more resilient and adaptable systems.

The Department of Education can utilize this study to inform policy and strategic planning by addressing systemic issues that contribute to the digital divide among teachers. The findings provide a compelling case for improving teacher training, bridging the digital divide, and promoting equitable technology integration. Additionally, this study contributes to a broader understanding of the importance of teacher digital literacy in the 21st century, raising awareness about the transformative potential of technology in education and the crucial role of teachers in realizing that potential.

## The integration of Digital Technology for Inclusive Education

Digital technology is transforming education by fostering inclusive learning environments through diverse tools and platforms that address the varied needs of learners and provide equitable access to quality education. Assistive technologies, as highlighted by Oyedokun (2025), such as AI-powered platforms like Audemy, offer personalized learning experiences for students with disabilities, enhancing engagement, and promoting self-confidence. Furthermore, collaborative tools like Google Classroom and gamified platforms like Minecraft: Education Edition, as noted by Herriott and McNulty (2022), facilitate communication, teamwork, and the development of essential social skills, preparing students for the digital workplace.

However, the effective integration of these technologies depends heavily on the preparedness of educators. Coker and Mercieca (2023) emphasize that teacher training in digital literacy and inclusive pedagogical strategies is essential for designing lessons that effectively utilize technology to meet diverse student needs. Professional development initiatives equip teachers with the necessary skills to use digital tools meaningfully in the classroom. In addition, community-based programs like the Yarona Digital Ambassadors Programme in South Africa are helping bridge the digital divide by empowering local communities with foundational digital skills. These initiatives not only promote digital inclusion but also enhance community participation in the digital economy and foster a culture of innovation. Despite the progress, more needs to be done to ensure these programs are comprehensive and aligned with evolving educational needs. As noted by Coker and Mercieca (2023), while existing training and community efforts are valuable, continuous improvement is needed to fully integrate technology into teaching practices and maximize its benefits.

The integration of digital technology plays a crucial role in advancing inclusive education. By improving access, encouraging collaboration, bridging digital gaps, and empowering both educators and learners, digital tools offer a path toward a more equitable and effective educational system. Sustained investment in infrastructure, ongoing teacher training, and community empowerment is a key to maintaining momentum in this area. Additionally, as Memon and Memon (2025) suggest, continuous research and assessment are vital to refining best practices and addressing challenges, ensuring that all students can thrive in a digitally inclusive learning environment.

## Theoretical Framework

The study aims to move beyond a surface-level analysis of technology use to delve into understanding how the strategic integration of digital tools and resources influences the learning experiences and outcomes of all students, with a particular focus on those with diverse needs. This includes exploring how teachers' TPACK enables them to leverage technology to differentiate instruction, provide accessible materials, and create engaging learning activities that cater to a wide range of learners. By applying the TPACK framework, the research can provide valuable insights into the specific knowledge and skills teachers require to harness the potential of digital technologies to promote equity and inclusion in education.

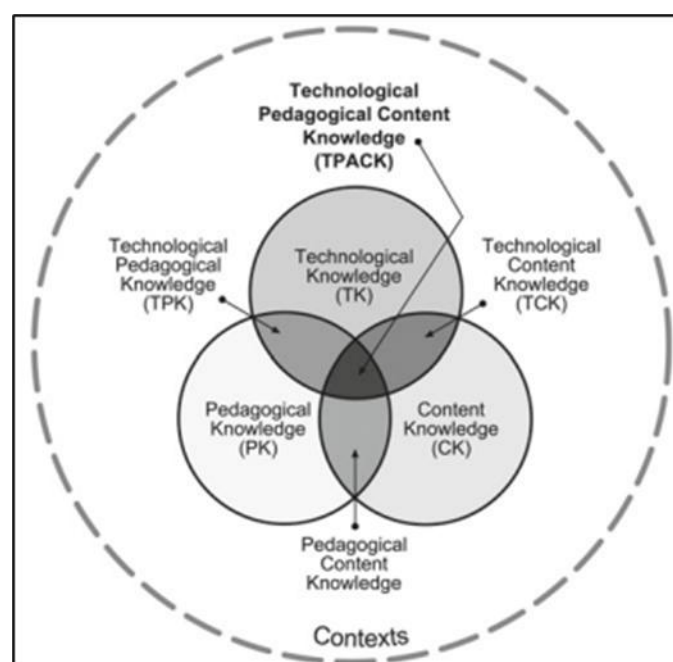


Figure 1: The Technological Pedagogical Content Knowledge Framework (Adopted from Mishra and Koehler, 2006)

Xu, et al. (2025) assert that Technological Pedagogical Content Knowledge (TPACK) is fundamental for effective and inclusive teaching, as it delineates the knowledge teachers need to successfully integrate technology into their practice. The TPACK framework goes beyond simply knowing how to use technology; it emphasizes the complex interplay between technology, pedagogy (teaching methods), and content (the subject matter). This framework highlights that teachers must understand how these three knowledge areas interact to design and deliver effective instruction (Mishra & Koehler, 2006). Given its comprehensive nature, the TPACK framework is particularly well-suited to guide this study, as it provides a robust lens through which to examine the multifaceted ways in which digital technology impacts inclusive learning within the classroom.

### Research Methodology

This study uses a qualitative research approach within an interpretivist paradigm to explore teacher perspectives and teaching methodologies in South African township secondary schools, aligning with the scoping review's purpose: to examine varied experiences and practices in digital technology integration and their contribution to inclusive education. Understanding technology application in diverse, especially under-resourced, settings is crucial for informing policy and practice in the evolving educational landscape.

The review employs a systematic approach, guided by Arksey and O'Malley's (2005) framework, involving: identifying studies through targeted searches; selecting studies based on criteria; charting data to capture themes; and collating, summarizing, and reporting findings. This structured, transparent process ensures comprehensiveness and reproducibility, enhancing the findings' reliability and credibility, and facilitating a holistic understanding of digital tool utilization across school environments to support inclusive and equitable education for all learners.

### Search Strategy

The study's methodology heavily relied on an automated literature search, employing pre-formulated search strings and keywords across Scopus, Web of Science, and ScienceDirect to efficiently and reliably identify scholarly works relevant to digital technology integration in South African education. This approach, consistent with Dinter et al. (2021), enhanced the efficiency and reliability of the review process. A detailed set of keywords and Boolean operators was used to ensure the search yielded contextually appropriate and methodologically sound primary studies, balancing high recall (capturing many relevant studies) with high precision (excluding irrelevant ones), which is crucial for scoping reviews dealing with broad topics like digital inclusion and educational equity.

Table 1: Search string

Topic	Search terms
Digital technology integration for inclusive education	"inclusive education" OR "ICT integration" OR "digital technology in education"  AND  "township schools" OR "secondary schools" OR "township secondary schools"

To further ensure the relevance and timeliness of the findings, the review was limited to studies published between 2021 and 2025. This period was selected to reflect the most recent developments in the field, particularly those influenced by the COVID-19 pandemic, which catalyzed a widespread shift toward digital learning in South African schools. The pandemic exposed long-standing infrastructural and pedagogical inequalities, prompting increased interest and investment in educational technologies. As such, focusing on this post-pandemic window allows the review to capture how schools have adapted—or are still adapting—to digital integration in ways that support inclusive education.

By targeting recent, locally grounded research, this study aims to provide an up-to-date and context-sensitive understanding of how digital technologies are being employed to promote inclusion in South African schools. This focus not only enhances the relevance of the review to current educational policy and practice but also contributes to broader global conversations about digital equity in education.

## Findings

### Identification of How Digital Technologies are Being Used to Promote (or Hinder) Inclusive Education

Digital technologies present a complex duality in their potential to promote or hinder inclusive education. On one hand, they offer powerful tools to personalize learning and accommodate diverse needs equitably (Memon & Memon, 2025). Assistive technologies, for instance, can provide crucial support for learners with disabilities, enabling them to access and engage with educational materials in ways that were previously impossible. Digital resources can be adapted to cater to various learning styles, offering multimedia formats, interactive simulations, and personalized learning pathways. Online platforms can facilitate differentiated instruction, allowing teachers to tailor content and activities to individual students' needs and pace. Furthermore, technology can help bridge socio-economic barriers by providing access to educational resources for students in remote or under-resourced communities. However, the integration of technology is not inherently equitable. The "digital divide" remains a significant concern, with disparities in access to technology, reliable internet, and digital literacy skills creating new forms of exclusion (Lata, 2024). If not implemented thoughtfully, technology can exacerbate existing inequalities, disproportionately affecting marginalized student populations.

The South African Education has seemed to be limiting educational processes as not all schools are exposed to relevant digital technologies to integrate into lesson and create a more inclusive learning environment. According to, Mhlongo, et al. (2023), digital divide remains the main factors that hinders the promotion of inclusive education. While other schools are well exposed to digital technology resources, some schools struggle to cater education for all learners.

### Exploring Teacher Perspectives

A key area of exploration will involve understanding teachers' perceived challenges related to digital literacy. In under-resourced township schools, teachers often encounter substantial obstacles in effectively integrating digital tools into their pedagogy. These challenges may include difficulties in using basic digital devices, navigating learning management systems, evaluating the credibility of online resources, and redesigning lessons for online or blended modalities (Rasheed, et al., 2020).

Another significant focus is on how the lack of digital skills impedes the creation of inclusive learning environments. Teachers in these schools may struggle to differentiate instruction using digital platforms, adapt materials for students with special educational needs, or use technology to address diverse learning styles and paces. Research shows that digital technologies, when appropriately leveraged, can support inclusive education by enabling personalized learning and facilitating access for students with disabilities. However, in contexts where digital proficiency is limited, such potential remains unrealized, contributing to further marginalization of vulnerable learners (Helsper, 2021).

The study also captured teachers' reflections on their experiences during the COVID-19 pandemic, a period that exposed and exacerbated digital inequities globally. For educators in South African township schools, the sudden shift to remote teaching presented profound challenges. Many faced limited or no access to devices and reliable internet, lacked formal training in online instruction, and received minimal institutional support (Ali, 2020). Teachers are likely to express a desire for sustained, contextually relevant training that moves beyond basic ICT skills to encompass pedagogical strategies for digital teaching. Such training must be ongoing, practical, and embedded within the realities of their teaching environments to be truly effective.

## Discussion

To what extent and in what ways does the integration of digital technologies impact the creation of inclusive learning environments within the context of South African public township secondary school practices?

The integration of digital technologies into South African classrooms remains limited and uneven, reflecting broader systemic and contextual challenges. Although the potential benefits of educational technologies are widely acknowledged, ranging from enhanced learner engagement to the facilitation of differentiated instruction, many schools across the country, particularly those in disadvantaged and rural areas, struggle to implement these tools effectively (Zwane & Mudau, 2023). Research indicates that this gap is driven by multiple interrelated factors that hinder meaningful use of digital technology in educational settings.

One of the most prominent barriers is the lack of adequate digital infrastructure. Many schools in South Africa do not have reliable access to computers, tablets, internet connectivity, or electricity, all of which are foundational for digital learning (South African Department of Basic Education [DBE], 2020). These infrastructural limitations are further compounded by significant disparities between urban and rural schools,

with township and rural schools often the most severely affected. Consequently, even basic use of educational technologies remains out of reach for many educators and learners.

Beyond infrastructure challenges, the widespread lack of digital literacy among South African teachers significantly hampers technology integration in classrooms. Many educators are unfamiliar with digital tools and lack the pedagogical skills to use them effectively (Kivunja, 2013). This is often due to limited exposure, low confidence, and scarce professional development opportunities focused on digital pedagogy, creating a disconnect between technological potential and classroom realities.

Teachers also struggle to align digital tools with curriculum goals or adapt their teaching strategies for digital environments. Effective integration requires more than technical skills—it demands pedagogical innovation and contextual support, which are often lacking (Mishra & Koehler, 2006). Without targeted training and mentorship, many educators remain tied to traditional methods. These issues are compounded by minimal support from the Department of Basic Education (DBE). Despite policy commitments to digital and inclusive education, implementation remains fragmented, and teachers are rarely offered structured, ongoing training (Dube, 2021). As a result, they are expected to deliver inclusive, tech-enhanced learning without the necessary tools or guidance. Although inclusive education is a national priority, its digital implementation is limited. Many schools lack essential resources like assistive technologies, accessible platforms, and adapted content, preventing meaningful support for learners with diverse needs (Engelbrecht et al., 2016; Walton, 2018). Consequently, inclusive education often remains theoretical, with marginalized students continuing to face exclusion.

In summary, the limited integration of digital technologies in South African schools is rooted in a confluence of infrastructural deficits, low levels of teacher digital literacy, inadequate training, and weak institutional support. Addressing these challenges requires a coordinated effort involving policy reform, increased investment in infrastructure, and the development of robust teacher training initiatives tailored to local contexts.

## Conclusion

The integration of digital technologies in South African schools is hampered by a combination of factors: inadequate digital infrastructure (particularly in disadvantaged and rural areas), widespread lack of teacher digital literacy, insufficient training and support for teachers, and weak institutional backing. This confluence of challenges hinders the effective use of technology to enhance learning and deliver inclusive education, leaving many educators ill-equipped and learners, especially those from marginalized groups, without access to equitable and enriched educational experiences. Addressing these issues requires systemic changes, including policy reform, increased investment in resources, and the development of targeted teacher training programs.

The limited and uneven integration of digital technologies in South African schools presents significant implications for practitioners in Learning for Sustainable Development (LSD). For LSD to be effectively promoted, especially in resource-constrained settings, practitioners must recognize that digital tools cannot be uniformly relied upon to deliver content or facilitate learning. They need to adopt a blended approach, combining digital resources with traditional, low-tech, and community-based methods to ensure inclusivity and accessibility. Practitioners should advocate for policies and investment that bridge the digital divide, while also prioritizing teacher training that equips educators to use technology effectively for LSD pedagogy, and to adapt their strategies to contexts with limited digital access. This includes developing culturally relevant digital materials, promoting critical digital literacy, and fostering sustainable practices in technology use itself.

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