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Integrating e-textbooks in South African classrooms: A systematic literature review of implementation barriers and educational potential

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ABSTRACT

The integration of digital technology in education is rapidly expanding globally, including within South African classrooms. This research review critically examined the digital learning environment in South Africa, focusing specifically on the pedagogical role of e-textbooks, their effectiveness as learning tools, the barriers affecting their integration, and the perceptions of teachers and learners regarding their use in South African classrooms. The review began by defining e-textbooks and outlining their current implementation in South African schools. It explored their future potential and examined how e-textbooks could address challenges such as limited access to physical textbooks, especially in under-resourced areas. While e-textbooks offer many advantages, the review also highlights major barriers, including poor infrastructure, the digital divide, insufficient teacher training, and low levels of digital literacy among both teachers and learners. A systematic literature review methodology was used to ensure academic rigour. The paper synthesized perception-related findings drawn from empirical studies identified in the systematic review, focusing on how teachers and learners experience e-textbooks in terms of usability, learning effectiveness, and integration into classroom practice. Sociocultural factors, such as language diversity and unequal access to digital tools, were discussed as part of the contextual realities that affect the implementation and everyday use of e-textbooks, rather than as a separate focus on digital adoption. In conclusion, the review highlighted that while e-textbooks offer meaningful benefits—such as improved accessibility, interactive learning opportunities, and reduced reliance on physical resources—their successful integration is hindered by persistent challenges, including inadequate infrastructure, limited teacher training, and unequal digital access.

Keywords: E-Textbooks, South African Classroom, Implementation, Teacher Training

INTRODUCTION

Due in large part to developments in digitization, technological integration has become increasingly important in today's educational environment. Research indicates that many teachers experience challenges when integrating technology into their teaching, particularly in identifying or designing pedagogically meaningful ways to use digital tools to support deeper conceptual understanding. Notably, the US, Korea, Singapore, and China have embraced digital textbooks' capacity for

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performance enhancement. Correspondingly, the South African administration likewise pursues the incorporation of technological advancements into educational settings. Through initiatives that supply learners with digital workbooks and electronic texts, the South African government aims to support innovation in teaching and learning. These efforts are intended to broaden access to learning materials, reduce dependence on printed textbooks, and align schooling with broader national digital transformation goals. However, the extent to which these initiatives foster educational progress varies widely, as their impact is shaped by school-level infrastructure, teacher readiness, and the uneven distribution of digital resources across the education system.

However, implementing ICT initiatives in South African schools remains a challenge. As Chigona and Chigona argue, ICT integration requires a pedagogical shift from traditional teacher-centred instruction toward more learner-focused approaches.[1] Furthermore, studies indicate that many South African educators lack adequate preparation and support to use digital tools effectively in their teaching.[2]

Compounding the issue, a study on public secondary schools in Atteridgeville found that teachers and students alike exhibit low levels of computer literacy, hindering the successful implementation of e-education. Specifically, the study revealed that "the challenges that hinder effective ICT integration to enhance teaching and learning at the schools" were significant factors. Adding to the complexity, the South African "e-Education policy" mandates that all learners be ICT-capable by 2013, yet it "yet it *fails to provide the implementation strategies required to meet this demand*."

Given the apparent gaps, addressing the barriers to successful ICT integration in South African classrooms will require a multifaceted approach. To the current youth, these digitized textbooks serve as significant instructional resources due to their core functionalities like their core functionalities such as supporting deeper understanding through examples, explanations, and activities that are tailored to the learner's immediate context or lesson focus, adaptive tailoring, and interactive simulation. Electronic texts provide innovative functionalities like keyword searches, note highlighting, linked module accessibility, and online connections between instructors/students via digital interfaces. Yet, South Africa's school digital learning environments encounter numerous difficulties. Among the obstacles faced by educators is effectively incorporating technology into instructional approaches. Incorporating technology into daily classes poses greater obstacles for instructors than initially anticipated. Prior studies endeavoured to describe E-Books' definitions and elucidate their pros and cons within the academic sphere. Investigations have also examined how technology complements teaching methods and the site surveys vital to help lecturers adapt e-textbooks.

METHODOLOGY

Research Design

This study employed a systematic literature review (SLR) to analyse existing research on the use, implementation, and perceptions of e-textbooks in South African schools. A systematic approach was selected to ensure a transparent, replicable, and comprehensive synthesis of available evidence, and to address the gap identified in the introduction concerning the absence of consolidated knowledge on e-textbook integration in basic education.

Search Strategy

The review followed a structured search process using predefined keywords and Boolean combinations. Academic databases accessed included Google Scholar, Scopus, EBSCOhost, Taylor & Francis Online, ERIC, and the CUT Discovery Service. Search terms included:

- "e-textbooks" OR "electronic textbooks"
- "Digital learning" AND "South Africa"

[1] A. Chigona and W. Chigona, "An Investigation of Factors Affecting the Use of ICT for Teaching in the Western Cape Schools," *Journal of Education* 50 (2010): 1–19.

[2] Leepo Modise and Ndikho Mtshiselwa, "The Natives Land Act of 1913 Engineered the Poverty of Black South Africans: A Historico-Ecclesiastical Perspective," *Studia Historiae Ecclesiasticae* 39, no. 2 (2013): 359–78.

- "ICT in education" AND "schools"
- "Teacher perception" OR "learner perception" AND "e-textbooks"

The search covered publications from 2013 to 2024, reflecting the period in which e-textbooks and digital learning gained prominence in South African basic education policy and practice.

Inclusion and Exclusion Criteria

Studies were included if they:

1. Focused on e-textbooks or digital learning resources in the South African school sector.
2. Reported on implementation, usability, teacher or learner perceptions, or contextual factors influencing e-textbook use.
3. Were peer-reviewed journal articles, policy documents, government reports, or conference papers.

Studies were excluded if they:

1. Focused exclusively on higher education or non-South African contexts.
2. Examined general ICT integration without reference to e-textbooks.
3. Lacked empirical or conceptual relevance to the review questions.

Screening Process

The search initially identified 120 sources, which were screened for duplicates and relevance. After removing duplicates, 94 records remained. Titles and abstracts were then reviewed against the criteria, resulting in the exclusion of 52 studies that lacked relevance or focused solely on technology without considering e-textbooks. A total of 42 full-text articles were assessed for eligibility, of which only those meeting conceptual and contextual relevance were retained for analysis.

Data Extraction and Analysis

Eligible studies were analysed using thematic synthesis. Key information was extracted, including:

- Study context and participants
- Research focus (implementation, perceptions, challenges)
- Findings related to e-textbook usability and pedagogical value
- Barriers to adoption
- Sociocultural and infrastructural factors

Themes were developed inductively and refined iteratively to generate a structured understanding of the opportunities and challenges associated with e-textbook use in South African schools.

Ethical Considerations

As a secondary analysis of publicly available literature, this study did not require ethical clearance. All sources are fully acknowledged and referenced.

Defining E-Textbooks

E-textbooks are digital, interactive learning resources designed to replace or supplement printed textbooks, accessible through devices such as tablets, laptops, and smartphones. Beyond their technical format, e-textbooks hold pedagogical significance within the Scholarship of Teaching and Learning (SoTL) because they represent a shift in how knowledge is accessed, mediated, and constructed in contemporary classrooms. Rather than functioning merely as digital replicas of print materials, e-textbooks incorporate multimedia features—such as hyperlinks, videos, audio explanations, embedded assessments, and annotation tools—that enable new forms of learner interaction, self-paced exploration, and multimodal understanding.[3]

From a SoTL perspective, the use of e-textbooks intersects with several key dimensions of teaching and learning. First, they reshape pedagogical practice, encouraging teachers to adopt more

[3] Ronghuai Huang et al., "The Roles of Electronic Books in the Transformation of Learning and Instruction," in *2013 IEEE 13th International Conference on Advanced Learning Technologies* (IEEE, 2013), 516–18, https://doi.org/10.1109/ICALT.2013.180.

interactive, learner-centred approaches that leverage digital features to deepen conceptual understanding. Second, they influence student learning processes, offering opportunities for personalised engagement, immediate feedback, and differentiated support. Third, e-textbooks raise questions about equity and access, an essential concern in the South African context where digital divides continue to affect participation and learning outcomes. These dimensions position e-textbooks not only as technological tools but as catalysts for rethinking instructional design, curriculum delivery, and the broader transformation of learning environments.

While e-textbooks offer advantages such as real-time updates, reduced long-term costs, and greater alignment with digital-age competencies, their implementation remains constrained by contextual factors. Many learners require reliable access to devices, electricity, and connectivity—resources that are unevenly distributed across South African schools. Additionally, teachers need adequate training to integrate e-textbooks effectively into their pedagogical repertoire, highlighting the SoTL emphasis on developing professional competence and reflective practice. These challenges demonstrate that the value of e-textbooks lies not only in their digital features but in how they are positioned within pedagogical theory, professional development, and the realities of South African schooling.

Technology Acceptance in Schools

Technology acceptance in schools extends beyond the simple adoption of digital tools; it involves a shift in teaching and learning practices that reflects broader concerns within the Scholarship of Teaching and Learning (SoTL). Integrating e-textbooks requires teachers to rethink pedagogy, classroom interaction, and the ways learners engage with content. As Chen et al. argue, successful technology integration depends not only on access to devices but on how educators conceptualise and enact technology-supported learning in their instructional contexts.[4] This aligns with SoTL's emphasis on reflective, evidence-informed teaching practices that prioritise meaningful learning.

Within South African classrooms, limited technological proficiency among teachers continues to hinder the adoption of digital tools. Teachers often report uncertainty about how to use technology in ways that support deeper conceptual understanding, collaborative learning, or differentiated instruction. Jannatussholihah and Sugirin further note that educators may feel excluded from conversations around digital reform, resulting in hesitancy and a reliance on traditional, teacher-centred methods.[5] These challenges reveal that technology acceptance is inseparable from questions of teacher identity, professional practice, and pedagogical transformation—central themes in SoTL.

Needs assessments and professional learning initiatives can play a significant role in supporting teachers to integrate e-textbooks effectively. Such approaches help identify specific areas where educators require development, including digital literacy, pedagogical strategies for multimodal learning, and familiarity with e-textbook features. These processes also align with SoTL's commitment to continuous improvement and reflective practice. However, structural constraints such as inadequate funding, insufficient time for professional development, and limited access to reliable digital infrastructure undermine these efforts. Many schools struggle to maintain existing technologies, let alone expand their digital ecosystems.

Barriers to adoption therefore operate not only at a technical level but also at a pedagogical and systemic level, shaping how teachers interpret their roles, manage time, and support learner engagement. Pressures related to curriculum coverage and standardised testing further restrict opportunities for teachers to experiment with technology-enhanced learning approaches. As Buza and Mula note, addressing teacher reluctance is essential for the success of e-learning initiatives; yet such reluctance is often rooted in broader systemic issues rather than resistance alone.[6]

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[4] Chih-Hung Chen, Morris Siu-Yung Jong, and Chin-Chung Tsai, "A Comparison of In-Service Teachers' Conceptions of Barriers to Mobile Technology-Integrated Instruction and Technology-Integrated Instruction," *Australasian Journal of Educational Technology*, February 5, 2022, 35–50, https://doi.org/10.14742/ajet.7299.

[5] Siti Jannatussholihah and Sugirin, "English Teacher Readiness in the Era of Disruption," in *Proceedings of the 1st International Conference on Language, Literature, and Arts Education (ICLLAE 2019)* (Paris, France: Atlantis Press, 2020), https://doi.org/10.2991/assehr.k.200804.007.

[6] Kastriot Buza and Freskina Mula, "The Role of the Teachers in the Integration of ICT in Teaching in Secondary Low

In this context, technology acceptance must be understood as a dynamic process that influences, and is influenced by, classroom practice. For e-textbooks to enhance teaching and learning meaningfully, schools must invest not only in devices and connectivity but also in pedagogical support, professional growth, and reflective teaching cultures. This positions technology adoption as a critical site of inquiry within SoTL and highlights its relevance to transforming learning environments in South African schools.[7]

Implementing E-Textbooks in the Classroom

The implementation of e-textbooks in classroom practice extends beyond the technical act of introducing digital devices; it requires meaningful pedagogical change. Teachers must determine how interactive e-textbook features—such as multimedia explanations, embedded assessments, and hyperlinks—can support deeper learning rather than functioning as digital equivalents of printed texts. This shift positions e-textbook implementation squarely within the concerns of the Scholarship of Teaching and Learning (SoTL), where the focus is on how teaching practices evolve to enhance student engagement, conceptual understanding, and reflective learning. As Johnson et al. note, teachers often feel uncertain or disconnected when expected to integrate unfamiliar technologies, and this hesitation can limit their ability to model effective digital learning behaviour for students.[8]

These pedagogical challenges are compounded by learner-related factors such as gender, digital familiarity, and preference for printed materials. Research shows that learner comfort with technology influences the extent to which digital resources are embraced, with some students citing eye strain or reduced annotation flexibility as reasons for preferring print.[9] Such findings highlight the need for teachers to scaffold digital reading practices and guide learners in using e-textbook features strategically to support comprehension. At the same time, evidence from digital learning environments suggests that interactive features can enhance learning outcomes when integrated thoughtfully.[10] This underscores that the effectiveness of e-textbooks depends largely on how teachers mediate their use in classroom practice.

Needs analyses offer one way to link technological implementation to pedagogical development. By systematically identifying teachers' strengths and gaps in digital competence, schools can design professional learning opportunities that build capacity for integrating e-textbooks into lesson design and classroom interaction.[11] Such processes align with SoTL's emphasis on reflective practice and evidence-informed improvement. However, structural barriers—such as unreliable power access, limited training, and inconsistent availability of devices—continue to constrain teachers' ability to experiment with new instructional approaches. When infrastructural challenges dominate, teachers may revert to traditional teaching methods, limiting opportunities for multimodal learning, formative feedback, or student-centred exploration.

Supporting learners also involves creating enabling learning environments. This includes sustained access to school digital libraries, reliable internet connectivity, and ongoing guidance for students who require digital literacy development or accommodations.[12] The implementation of e-textbooks further extends beyond the classroom, as parental understanding and support influence how learners engage with digital resources at home. Cai emphasises that parents need guidance to help

Education," *European Journal of Social Sciences Education and Research* 10, no. 2 (May 19, 2017): 240, https://doi.org/10.26417/ejser.v10i2.p240-247.

[7] Buza and Mula, "The Role of the Teachers in the Integration of ICT in Teaching in Secondary Low Education."

[8] Amy M. Johnson et al., "Challenges and Solutions When Using Technologies in the Classroom," in *Adaptive Educational Technologies for Literacy Instruction* (New York, NY : Routledge, 2016.: Routledge, 2016), 13–30, https://doi.org/10.4324/9781315647500-2.

[9] OliverH. Lowry et al., "Protein Measurement with the Folin Phenol Reagent," *Journal of Biological Chemistry* 193, no. 1 (November 1951): 265–75, https://doi.org/10.1016/S0021-9258(19)52451-6.

[10] 2016 ADEA TechExpo, " Abstracts of Presentations," *Journal of Dental Education* 80, no. 2 (February 2016): 250–54, https://doi.org/10.1002/j.0022-0337.2016.80.2.tb06078.x.

[11] M. M. Rahman and M. K. Hossain, "Learners' Attitudes and Perceptions of Blended MEd Programme Towards OER-Based Self-Learning Materials," *DEStech Transactions on Social Science, Education and Human Science*, no. ICEdDE (January 23, 2020), https://doi.org/10.12783/dtssehs/ICEdDE2019/33697.

[12] Maria Earman Stetter, "The Use of Technology to Assist School-Aged Students with High Incidence Special Needs in Reading," *Education Sciences* 8, no. 2 (April 24, 2018): 61, https://doi.org/10.3390/educsci8020061.

learners navigate digital content and manage technological challenges, underscoring the broader ecosystem needed for successful e-textbook use.[13]

Ultimately, the effective implementation of e-textbooks requires careful attention to the ways technology reshapes teaching practice, learner behaviour, and classroom interaction. Schools must invest not only in hardware, electrical infrastructure, and connectivity, but also in professional learning communities, digital pedagogy training, and mechanisms for understanding student preferences.[14] Without such support, e-textbooks risk being implemented superficially, reinforcing existing pedagogical patterns instead of transforming learning. From a SoTL perspective, these challenges illustrate that technology adoption must be accompanied by pedagogical reflection, continuous professional development, and collaborative engagement if e-textbooks are to contribute meaningfully to improved learning experiences.

The Future of E-Textbooks: Challenges and Considerations

The future of e-textbooks in South African schools cannot be understood solely in terms of infrastructure, access, or technology readiness; rather, it must be examined through the lens of the Scholarship of Teaching and Learning (SoTL), where the central concern is how digital tools reshape teaching practice, learning processes, and the pedagogical relationship between teachers and students. The successful adoption of e-textbooks, therefore, hinges not only on technological availability but on the capacity of teachers to adapt their instructional strategies and support learners in engaging meaningfully with digital content. Research shows that students rarely make effective use of advanced e-textbook features unless teachers actively model and integrate these tools into their pedagogy,[15] highlighting the professional learning demands placed on educators.

Teacher readiness continues to be a significant constraint. Limited training and gaps in digital competence impede educators' ability to integrate e-textbooks into lesson planning, formative assessment, and learner engagement activities.[16] From a SoTL perspective, insufficient training undermines teachers' opportunities to develop reflective, evidence-informed practice and restricts their ability to experiment with new instructional approaches. This challenge directly influences learner outcomes: when digital features are underutilised, the pedagogical advantage of e-textbooks—such as interactive explanation, multimodal learning, or self-paced exploration—remains unrealised.

Differences in how teachers and students use e-textbooks also raise important pedagogical considerations. Students tend to focus on annotation and navigation, while instructors utilise e-textbooks for content distribution or administrative tasks.[17] These differing patterns suggest that teachers must explicitly scaffold digital reading practices to promote conceptual understanding and metacognitive engagement—core concerns of SoTL. Learner characteristics, such as gender and digital familiarity,[18] further complicate the landscape, requiring teachers to adapt instruction to varied levels of digital readiness and learning preference.

Institutional decision-making practices play a critical role in shaping how e-textbooks influence classroom teaching. When teachers are excluded from decisions about digital resource adoption, they may experience alienation, reducing their willingness to integrate new tools into instruction.[19] This lack of consultation also undermines a central tenet of SoTL: that effective teaching innovation emerges through reflective dialogue, collaboration, and professional agency. Without these processes, e-

[13] Qiao-Yu Warren Cai, "Constructing Assessment Indicators Weight System of Digital Business Chinese Materials," *Sage Open* 11, no. 3 (July 22, 2021), https://doi.org/10.1177/21582440211047555.

[14] Ljerka Jukić Matić, "The Teacher as a Lesson Designer," *Center for Educational Policy Studies Journal* 9, no. 2 (June 20, 2019): 139–60, https://doi.org/10.26529/cepsj.722; S. Al-Ali and A. Ahmed, "E-Textbooks in ESL Classrooms: Are Learners on Board? ," *Learning and Teaching in Higher Education: Gulf Perspectives* 12, no. 2 (2015): 3–22.

[15] Johnson et al., "Challenges and Solutions When Using Technologies in the Classroom."

[16] Olga Trishchuk et al., "Student's and Teachers' Perception of Using Electronic Textbooks in Educational Process.," *Advanced Education* 7, no. 15 (July 19, 2020): 116–23, https://doi.org/10.20535/2410-8286.208318.

[17] Jo R. Jardina, Barbara S. Chaparro, and Sue Abdinnour, "Extending the Task-Technology Fit (TTF) Model to E-Textbook Usage by Students and Instructors," *International Journal of Information and Communication Technology Education* 17, no. 1 (January 1, 2021): 120–37, https://doi.org/10.4018/IJICTE.2021010108.

[18] William Douglas Woody, David B. Daniel, and Crystal A. Baker, "E-Books or Textbooks: Students Prefer Textbooks," *Computers & Education* 55, no. 3 (November 2010): 945–48, https://doi.org/10.1016/j.compedu.2010.04.005.

[19] Jannatussholihah and Sugirin, "English Teacher Readiness in the Era of Disruption."

textbook implementation risks becoming superficial and procedurally driven rather than pedagogically meaningful.

Practical resources such as power outlets, device availability, and reliable access to digital textbooks remain necessary for supporting implementation at scale.[20] However, these infrastructural concerns must be linked to the pedagogical work of teaching. For example, teachers cannot design interactive lessons using e-textbooks if learners are unable to access devices consistently. Similarly, professional development that focuses solely on operational skills overlooks the more complex instructional design principles required to integrate digital content into teaching in ways that promote deeper learning. Addressing such gaps requires sustained professional development aligned with both technical competence and pedagogical transformation.

Looking ahead, the future of e-textbooks depends on creating professional learning environments where teachers can develop, test, and refine digital teaching strategies. Collaborative decision-making, professional development workshops, and mentorship from instructional technology specialists can support teachers in navigating the complexities of digital pedagogy.[21] Students also require guidance on how to use e-textbooks, reinforcing the need for a whole-school approach to digital learning.[22]

Ultimately, the trajectory of e-textbook adoption is shaped by more than policy directives and infrastructure; it is shaped by how teachers make pedagogical choices, how students engage with digital content, and how schools cultivate reflective, research-informed teaching practices. A SoTL-oriented approach thus requires continuous inquiry into how e-textbooks influence learning processes, how digital tools shift classroom roles, and how professional learning can support teachers in transforming their practice. Only by foregrounding these pedagogical dimensions can e-textbooks realise their potential to enhance learning in South African classrooms.

Addressing Teachers' Technological Skills

Developing teachers' technological skills is essential for effective e-textbook integration, but this work must be understood within broader debates about pedagogy, professional development, and the Scholarship of Teaching and Learning (SoTL). Teacher proficiency is not simply a matter of technical competence; it is tied to the ability to design learning experiences, adapt instructional strategies, and critically reflect on how digital tools reshape classroom interaction. Training programmes must therefore extend beyond operational demonstrations to include opportunities for teachers to engage with the pedagogical affordances of e-textbooks and consider how these tools can transform their teaching practices.[23]

Professional development must be interactive, sustained, and grounded in authentic classroom contexts. Teachers need space to experiment with e-textbook features, evaluate their impact on student learning, and refine their instructional approaches. From a SoTL perspective, such reflective, iterative engagement supports the development of professional judgement and contributes to a culture of inquiry in which teachers view digital pedagogy as integral to their practice rather than as an add-on. Access to computer labs, digital mentors, and ongoing support structures can further enable teachers to build confidence and competence in integrating e-textbooks into learning activities.

Addressing teachers' technological skills also requires resolving structural barriers that shape the teaching environment. Limited access to devices, insufficient power outlets, and unreliable infrastructure constrain teachers' ability to utilise e-textbooks consistently and creatively.[24] Ensuring that every student has regular access to a compatible device and to a comprehensive digital library is

[20] Aubrey Hibajene Mweemba, "Exploratory Factor Analysis of the Perceptions of Secondary School Heads of Departments on Teacher Trainees' Pedagogical Practices in Three Districts of Zambia," *International Journal of Current Science Research and Review* 05, no. 07 (July 5, 2022), https://doi.org/10.47191/ijcsrr/V5-i7-08.

[21] Lowry et al., "Protein Measurement With The Folin Phenol Reagent."

[22] Al-Ali and Ahmed, "E-Textbooks in ESL Classrooms: Are Learners on Board? ."

[23] Hung, D.T. and Mai, L.X., "EFL Teachers' Perceptions of the Use of e-Textbooks at Secondary Schools in Dong Thap Province," *Can Tho University Journal of Science* Vol.12(2) (2020): 15, https://doi.org/10.22144/ctu.jen.2020.011.

[24] Iryna Vorotnykova, "Organizational, Psychological and Pedagogical Conditions for the Use of E-Books and e-Textbooks at School," *Turkish Online Journal of Distance Education* 20, no. 3 (July 1, 2019): 89–102, https://doi.org/10.17718/tojde.598227.

therefore essential. These investments not only support equitable learning opportunities but also reinforce teachers' capacity to plan lessons that integrate digital content meaningfully.

Active and meaningful engagement with e-textbooks depends on the learning experiences the teacher designs. Incorporating multimedia resources, interactive quizzes, or collaborative digital activities can enhance student participation and conceptual understanding. However, if teachers feel excluded from decisions about technology adoption or unsupported during implementation, they may remain hesitant to embrace digital pedagogy. Training must therefore address both technical skills and teachers' sense of ownership and agency in shaping technology-supported learning.

Ongoing professional development plays a critical role here. Schools must provide structured opportunities for teachers to learn, reflect, and discuss strategies for using e-textbooks in instruction.[25] Such training should highlight pedagogical models for digital learning, illustrating not only how to navigate e-textbooks but how to integrate them into lesson planning, assessment, and student engagement. Professional support systems—peer collaboration, coaching, or learning communities—can further enhance teachers' confidence and promote sustained instructional change.

Finally, addressing technological and infrastructural limitations remains essential to supporting pedagogical innovation. Investments in power outlets, portable charging solutions, or school-owned devices ensure that learners can access e-textbooks equitably and consistently.[26] When infrastructure is reliable, teachers are more likely to integrate digital content into lessons without fear of disruption. Such systemic support reinforces teachers' professional development and aligns with SoTL principles that view teaching as an adaptive, inquiry-driven practice.

Therefore, strengthening teachers' technological skills is not merely a technical challenge but a pedagogical and professional one. It requires sustained training, reflective practice, collaborative learning, and supportive infrastructure—elements central to both effective digital pedagogy and the broader SoTL agenda.

RECOMMENDATIONS

Effective integration of e-textbooks requires a coordinated strategy that addresses both pedagogical and infrastructural realities. First, educational institutions should prioritise comprehensive and ongoing teacher training that extends beyond technical orientation to include strategies for embedding e-textbooks meaningfully in instructional practice. Such training should support teachers in developing digital reading pedagogies, designing multimodal learning experiences, and modelling the effective use of e-textbook features. Access to support structures—such as computer labs, instructional technologists, and digital mentors—can enhance this process.

Second, institutions must ensure that the physical and digital infrastructure is sufficient to support equitable access. This includes increasing the number of power outlets in classrooms, investing in portable charging solutions, and expanding access to devices through school-owned hardware or financial support initiatives. Ensuring that students have consistent access to a comprehensive digital library of e-textbooks is essential for meaningful participation and engagement.[27]

Third, educational institutions should establish clear guidelines and best practices for e-textbook use. These may include protocols for hardware and software selection, processes for content updates, and consultation mechanisms that involve teachers in decision-making.[28] Involving teachers early fosters ownership and reduces resistance to change, thereby promoting more sustainable adoption.

Finally, interactive technologies and collaborative digital tasks should be integrated into e-textbook use to enhance learner engagement. Teachers, school leaders, and parents must work together

[25] Mohd. Elmagzoub Eltahir, Sami Al-Qatawneh, and Najeh Alsalhi, "E-Textbooks and Their Application Levels, from the Perspective of Faculty Members at Ajman University, U.A.E.," *International Journal of Emerging Technologies in Learning (IJET)* 14, no. 13 (July 15, 2019): 88, https://doi.org/10.3991/ijet.v14i13.9489.

[26] Eltahir, Al-Qatawneh, and Alsalhi, "E-Textbooks and Their Application Levels, from the Perspective of Faculty Members at Ajman University, U.A.E."

[27] Vorotnykova, "Organizational, Psychological and Pedagogical Conditions for the Use of E-Books and e-Textbooks at School."

[28] Kim Roberts, Angela Benson, and Jamie Mills, "E-Textbook Technology: Are Instructors Using It and What Is the Impact on Student Learning?," *Journal of Research in Innovative Teaching & Learning* 14, no. 3 (November 26, 2021): 329–44, https://doi.org/10.1108/JRIT-04-2021-0028.

to create a supportive ecosystem that enables learners to navigate digital materials confidently and purposefully.[29]

CONCLUSION

In conclusion, the integration of e-textbooks in education is shaped by a complex interplay of pedagogical, infrastructural, and contextual factors. While e-textbooks hold considerable potential to enrich teaching and learning through multimodal content and interactive features, their impact depends on teachers' capacity to integrate these resources into coherent instructional designs and reflective pedagogical practices. The challenges identified in this review—ranging from insufficient teacher preparation to infrastructural limitations and uneven learner access—underscore the need for systemic support and sustained professional development.By addressing these challenges through targeted training, reliable infrastructure, collaborative decision-making, and clear institutional guidelines, educational institutions can create conditions that enable e-textbooks to contribute meaningfully to teaching and learning. A holistic, SoTL-informed approach is therefore essential for realising the transformative potential of e-textbooks and supporting equitable, engaging, and digitally enriched learning experiences for all students.

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