

Examining the Effectiveness of Digital Learning Platforms in Early Literacy Development: A Case Study of Three Selected Primary Schools in Katete District, Eastern Zambia

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Abstract. Early literacy development is a critical foundation for learners' academic success and lifelong learning. Despite increased efforts to improve early-grade reading outcomes in Zambia, many learners in lower primary grades continue to demonstrate low levels of literacy proficiency. In response to these challenges, digital learning platforms have increasingly been introduced in primary schools as supplementary instructional tools aimed at enhancing early literacy skills. However, there is limited empirical evidence on the effectiveness of such platforms, particularly in rural districts. This study examined the effectiveness of digital learning platforms in early literacy development through a case study of three selected primary schools in Katete District, Eastern Zambia. The study adopted a mixed-methods case study design, combining quantitative and qualitative approaches to provide a comprehensive evaluation of digital learning platform use. Quantitative data were collected using baseline and post-test early literacy assessments administered to Grade 1 and Grade 2 learners, while qualitative data were obtained through teachers' questionnaires, interviews with school administrators, and classroom observations. The findings revealed that learners exposed to digital learning platforms demonstrated measurable improvement in key early literacy skills, particularly letter recognition, phonemic awareness, and word decoding. Improvements were also observed in oral reading fluency and reading comprehension, although gains in these areas were relatively modest. Teachers generally perceived digital learning platforms as effective in enhancing learner engagement and motivation, especially through audio-visual and interactive features. However, the effectiveness of the platforms was influenced by contextual and implementation factors, including availability of digital devices, reliability of electricity supply, teacher competence, and consistency of platform use. The study concludes that digital learning platforms can play a positive role in supporting early literacy development in rural primary schools when integrated into regular classroom instruction and supported by adequate infrastructure and teacher training. The study recommends increased investment in digital infrastructure, continuous professional development

for teachers, and structured integration of digital learning platforms into early literacy programmes. The findings contribute context-specific empirical evidence to inform educational policy, practice, and future research on digital learning and early literacy development in Zambia.

keywords: Digital learning platforms, Early literacy development, Primary education, Literacy skills, Educational technology, Digital education

I. Introduction

1. Overview

Chapter one has presented the introductory framework of the study titled “Examining the Effectiveness of Digital Learning Platforms in Early Literacy Development”: A Case Study of Three Selected Primary Schools in Katete District, Eastern Zambia. The chapter established the context and rationale for the study and outlines the key elements that guided the research.

Digital learning platforms (DLPs) including educational apps, interactive e-books, web-based lessons, and teacher dashboards are increasingly used to support early literacy. In Zambia and other low- and middle-income contexts, DLPs promise to supplement limited teaching resources, provide differentiated practice, and engage young learners. However, there is limited rigorous evidence in many districts about whether these platforms actually improve core early literacy skills (phonemic awareness, letter knowledge, decoding, fluency, vocabulary, comprehension) when implemented in real primary school settings, and what contextual factors (teacher training, electricity/internet access, device availability, parental involvement) influence outcomes. This study evaluated the effectiveness of selected digital learning platforms in improving early literacy among lower primary learners in three primary schools namely; Kanyebele Primary School, David Seidenfield Primary School and Nkhunga Primary School of Kanjeza Zone in Katete District, Eastern Province, Zambia.

2. Background of the study

Early literacy development forms the foundation for all subsequent learning and academic achievement. Skills such as letter recognition, phonemic awareness, decoding, oral reading fluency, vocabulary, and basic comprehension acquired in the early years of primary education are critical predictors of learners’ long-term educational success. When these foundational skills are not adequately developed in the lower grades, learners are more likely to experience persistent learning difficulties, poor academic performance, and increased risk of school dropout in later years. Consequently, improving early literacy outcomes has become a major priority for education systems worldwide, particularly in low- and middle-income countries.

Globally, many education systems continue to face challenges in achieving satisfactory early-grade reading outcomes. Large class sizes, limited instructional materials, insufficient teacher training, and inadequate learner support have contributed to low literacy levels among early-grade learners. In response to these challenges, digital learning platforms have increasingly been introduced as innovative tools to support teaching and learning. Digital learning platforms such as tablet-based applications, interactive e-books, and computer-assisted learning programmes are designed to provide engaging, individualized, and repetitive practice of literacy skills, often accompanied by audio-visual support and immediate feedback. These features are considered particularly beneficial for early literacy instruction, where frequent practice and reinforcement are essential.

In sub-Saharan Africa, digital learning platforms have been promoted as potential solutions to structural constraints affecting early literacy instruction. Several countries in the region have piloted or scaled digital learning initiatives aimed at improving foundational skills, including reading and numeracy. Evidence from some of these initiatives suggests that digital platforms can improve learner engagement and support the acquisition of basic literacy skills, especially when integrated with teacher-led instruction. However, the effectiveness of these platforms has been shown to vary widely depending on contextual factors such as infrastructure availability, teacher preparedness, and consistency of implementation.

In Zambia, early literacy development remains a significant educational concern. National assessments and educational reports have consistently indicated that a large proportion of learners in the early grades struggle to read at grade-appropriate levels. Factors such as limited access to reading materials, insufficient teacher support, and socio-economic challenges have contributed to these outcomes. In recognition of these challenges, the Zambian government and its development partners have increasingly embraced the use of information and communication technologies (ICTs) and digital learning platforms as part of broader efforts to improve the quality of education.

Zambia's education policies emphasize the integration of ICTs into teaching and learning as a means of enhancing instructional delivery and expanding access to learning resources. Digital learning platforms have been introduced in some primary schools through government initiatives, donor-funded programmes, and public-private partnerships. These platforms are used to support literacy instruction through phonics activities, interactive reading exercises, audio-supported storytelling, and learner assessment tools. The COVID-19 pandemic further accelerated the adoption of digital learning approaches in Zambia, highlighting both their potential to support learning continuity and the significant disparities in access between urban and rural areas.

Despite increasing adoption, the effectiveness of digital learning platforms in improving early literacy outcomes in Zambia has not been sufficiently evaluated, particularly at the district and school levels. Existing studies and reports often focus on access, teacher perceptions, or general ICT integration rather than on measurable literacy

outcomes among early-grade learners. Moreover, many available studies are descriptive in nature and do not combine learner performance data with in-depth analysis of implementation conditions. This limits the extent to which policymakers and educators can make evidence-based decisions regarding the expansion or modification of digital learning initiatives.

Katete District, located in Eastern Province of Zambia, presents a relevant context for examining the effectiveness of digital learning platforms in early literacy development. Like many districts in the province, Katete includes both peri-urban and rural primary schools that face challenges related to infrastructure, teacher deployment, and access to learning resources. Some schools in the district have begun using digital learning platforms to support early literacy instruction, creating an opportunity to examine how these platforms function in real classroom settings and whether they contribute to improved literacy outcomes among learners.

Furthermore, variations in school resources, teacher capacity, and community support within Katete District provide a useful setting for a case study approach. Evaluating digital learning platforms across three selected primary schools allows for comparative analysis of how contextual factors influence effectiveness. Such an evaluation is particularly important for informing district-level planning and ensuring that digital learning interventions are adapted to local realities rather than implemented as uniform solutions.

Against this background, this study seeks to evaluate the effectiveness of digital learning platforms in early literacy development through a case study of three selected primary schools in Katete District, Eastern Zambia. By examining both learner literacy outcomes and the conditions under which digital platforms are implemented, the study aims to generate localized empirical evidence that can inform educational practice, policy formulation, and future investments in digital learning. The findings are expected to contribute to a deeper understanding of how digital learning platforms can be effectively leveraged to strengthen early literacy development in rural and peri-urban primary school contexts.

3. Problem Statement

While policy and donor investments have increased access to DLPs in Zambia's primary schools, there is sparse localized evidence on whether these platforms lead to measurable improvements in early literacy in Katete District. School leaders and policy-makers need evidence on learning outcomes, implementation challenges, and contextual moderators to inform scale-up decisions. Without such evidence, investments risk being inefficient or inequitable.

4. Purpose of the Study

The purpose of this study was to evaluate the effectiveness of digital learning platforms in promoting early literacy development among learners in selected primary schools namely; Kanyebele Primary School, David Seidenfield Primary School and

Nkhunga Primary School of Kanjeza Zone in Katete District, Eastern Province, Zambia. Specifically, the study sought to examine the extent to which the use of digital learning platforms contributes to the development of foundational literacy skills, including letter recognition, phonemic awareness, word decoding, oral reading fluency, and basic reading comprehension among early-grade learners.

In addition, the study aimed to explore how digital learning platforms are implemented within the selected schools and to assess teachers' perceptions, experiences, and practices related to their use in early literacy instruction. By examining both learner literacy outcomes and contextual factors such as teacher competence, availability of infrastructure, frequency of platform use, and school-level support, the study intends to provide a comprehensive understanding of the conditions under which digital learning platforms are effective.

Ultimately, the study sought to generate empirical, context-specific evidence that can inform educational practice, policy formulation, and decision-making regarding the integration and scaling of digital learning platforms in primary schools, particularly in rural and resource-constrained settings such as Katete District.

5. Objectives of the Study

General objective

This study was guided by the following general objectives:

To assess whether the use of digital learning platforms leads to improvements in early literacy outcomes among learners in selected primary schools.

Specific objectives

This study was guided by the following specific objectives:

- To measure changes in learners' early literacy skills associated with DLP use.
- To explore teachers' and head teachers' perceptions of DLP implementation, usefulness, and challenges.
- To identify contextual factors (infrastructure, training, home environment) associated with successful literacy gains.
- To provide recommendations for improving DLP implementation in primary schools in Katete District.

6. Research Questions

This study was guided by the following research questions:

- Does the use of digital learning platforms improve early literacy outcomes (letter recognition, phonemic awareness, decoding, fluency, vocabulary, comprehension) among learners in the selected schools?
- What are teachers' and head teachers' perceptions of the usefulness, ease of use, and challenges of the DLPs?
- What school-level and home-level contextual factors influence the effectiveness of DLPs in promoting early literacy?

- What practical recommendations can be made to improve DLP implementation for early literacy in Katete District?

7. Significance of the Study

This study provides localized empirical evidence for policy-makers, district education offices, school managers, and cooperating partners on the learning impact of digital learning platforms (DLPs) in Katete District. It highlights key implementation bottlenecks, such as limited infrastructure and inadequate teacher training, while also identifying enabling factors that support effective integration of digital tools in early literacy instruction. In doing so, the study contributes to the growing body of academic literature on technology-enhanced learning, particularly within low-resource educational settings. Furthermore, it offers practical and actionable recommendations aimed at improving teacher capacity, strengthening technological infrastructure, and promoting community engagement, thereby supporting informed decision-making and sustainable scaling of digital learning initiatives.

7. Delimitation

This study was deliberately delimited in scope to ensure feasibility, focus, and depth of analysis. Geographically, the study was confined to Katete District in Eastern Province, Zambia, and specifically to three selected primary schools within the district. The selection of these schools was based on their use of digital learning platforms in early literacy instruction and was intended to provide an in-depth case study rather than a broad national survey.

In terms of population, the study focused on early-grade learners in Grade 1 and Grade 2, as these grades represent the critical period for early literacy development. Teachers responsible for teaching literacy in these grades, as well as selected school administrators, were included in the study. Learners in higher grades, teachers of other subjects, parents, and education officials beyond the school level were excluded from the scope of the study.

The content of the study was delimited to the evaluation of digital learning platforms used specifically for early literacy development. The study concentrated on foundational literacy skills, namely letter recognition, phonemic awareness, word decoding, oral reading fluency, and basic reading comprehension. Other learning areas such as numeracy, science, or upper-level literacy skills were not examined.

Methodologically, the study adopted a mixed-methods case study approach, combining quantitative assessments of learners' literacy performance with qualitative data from teachers and school administrators. The study did not employ a randomized controlled trial or large-scale experimental design, as its primary aim was to generate context-specific insights into effectiveness and implementation rather than broad generalizations.

Finally, the study was delimited in terms of time. Data collection was conducted within a defined research period, focusing on short-term literacy outcomes associated with the use of digital learning platforms. Long-term effects on literacy development beyond the study period were therefore outside the scope of the research.

These delimitations were intentionally set to allow for a manageable and focused investigation while providing meaningful insights into the effectiveness of digital learning platforms in early literacy development within the selected primary schools in Katete District.

8. Limitations of the Study

Despite careful planning and implementation, this study was subject to certain limitations that should be considered when interpreting the findings. First, the study employed a case study design involving three selected primary schools namely; Kanyebele Primary School, David Seidenfield Primary School and Nkhunga Primary School of Kanjeza Zone in Katete District, Eastern Province, Zambia. While this approach allows for in-depth analysis within a real-life context, it limits the generalizability of the findings to other districts or regions in Zambia. The results therefore reflect the specific conditions and experiences of the selected schools.

Second, the study focused on early-grade learners in Grade 1 and Grade 2 and assessed literacy outcomes over a relatively short intervention period. As a result, the study may not capture the long-term effects of digital learning platforms on literacy development, particularly higher-order reading skills such as advanced comprehension that typically develop over extended periods.

Third, variations in infrastructure and resources across the selected schools, including differences in access to electricity, digital devices, and internet connectivity, may have influenced the consistency of digital learning platform use. Such variations could affect learners' exposure to digital content and, consequently, their literacy outcomes, making it difficult to attribute observed changes solely to the digital learning platforms.

Fourth, the effectiveness of digital learning platforms in the study was partly influenced by teacher competence and implementation fidelity. Differences in teachers' digital skills, teaching experience, and adherence to recommended usage practices may have affected how the platforms were integrated into literacy lessons. Although efforts were made to document these differences, they may still have introduced variability in the results.

Fifth, data collection relied on teacher self-reports through questionnaires and interviews to capture perceptions and implementation practices. Self-reported data are subject to potential bias, including social desirability bias, which may affect the accuracy of the information provided. To mitigate this limitation, classroom observations and learner assessment data were used to triangulate findings.

Finally, external factors such as learner absenteeism, school calendar disruptions, or unforeseen events (e.g., power outages or scheduling changes) may have influenced data collection and learner performance during the study period. While such factors were beyond the control of the researcher, they were acknowledged and considered during data analysis and interpretation.

Despite these limitations, the study employed a mixed-methods approach and multiple data sources to enhance the credibility and trustworthiness of the findings. The identified limitations do not invalidate the study but rather provide important context for understanding and applying the results.

9. Operational Definition of Key Terms

For the purpose of this study titled Examining the Effectiveness of Digital Learning Platforms in Early Literacy Development: A Case Study of Three Selected Primary Schools in Katete District, Eastern Zambia, the following key terms are defined operationally as they are used within the context of this research:

10. Digital Learning Platforms (DLPs)

In this study, digital learning platforms refer to computer-based or tablet-based software, applications, or digital systems used in the selected primary schools to support early literacy instruction. These platforms include interactive literacy applications, digital reading programmes, and audio-visual learning tools designed to teach and reinforce foundational reading skills.

Early Literacy Development

Early literacy development refers to the acquisition of foundational reading skills among Grade 1 and Grade 2 learners, specifically letter recognition, phonemic awareness, word decoding, oral reading fluency, vocabulary, and basic reading comprehension, as measured through the study's literacy assessment tools.

Phonemic Awareness

Phonemic awareness refers to learners' ability to identify, recognise, and manipulate individual sounds (phonemes) in spoken words, as assessed through sound identification and blending tasks in the literacy assessment.

Letter Recognition

Letter recognition refers to learners' ability to correctly identify and name alphabet letters presented in upper-case and lower-case forms during the literacy assessment.

Word Decoding

Word decoding refers to learners' ability to read and pronounce simple, familiar words by applying letter-sound relationships, as measured through word reading tasks in the literacy assessment.

Conclusion

In conclusion, this chapter has provided a comprehensive foundation for the study on the effectiveness of digital learning platforms in early literacy development in selected primary schools in Katete District, Eastern Zambia. The chapter outlined the background to the study, highlighting the growing integration of digital technologies in education and their potential to enhance literacy skills among early-grade learners. It also established the problem statement, which emphasized the uncertainty surrounding the actual impact of digital learning platforms on literacy outcomes in rural and semi-urban primary school contexts.

Furthermore, the chapter clearly presented the purpose of the study, along with specific objectives and research questions that guide the investigation. The significance of the study was also discussed, demonstrating its relevance to policymakers, educators, and other stakeholders in improving literacy instruction through technology. Additionally, the scope and limitations of the study were defined to provide clarity on the study boundaries and anticipated challenges.

Overall, Chapter One sets the stage for the subsequent chapters by establishing the rationale and direction of the research. It underscores the need to empirically evaluate how digital learning platforms contribute to early literacy development, particularly within the Zambian context, where evidence-based insights are essential for informed educational planning and policy formulation.

II. Literature Review

Overview

This chapter reviewed literature related to the effectiveness of digital learning platforms in early literacy development. It examined global, regional and Zambian studies, theoretical frameworks, implementation factors and research gaps.

Introduction

For this review, digital learning platforms (DLPs) are defined as tablet- or computer-based software, web portals, interactive e-books, or app ecosystems designed to teach, scaffold or practice literacy skills and to provide usage data for teachers (World Bank, 2022). Early literacy outcomes are operationalised as measurable foundational skills: letter knowledge, phonemic awareness, decoding/word reading, oral reading fluency, vocabulary, and early comprehension (Gove & Wetterberg, 2011). This chapter emphasises evidence from randomized and quasi-experimental studies, systematic reviews and large-scale program reports because these offer the strongest basis for causal inference and programme design.

Digital learning platforms (DLPs) including tablet-based adaptive apps, interactive e-books, web portals and teacher dashboards are widely promoted as tools to accelerate foundational literacy by providing individualized practice, multimedia reinforcement,

and data for teachers (e.g., automatic progress dashboards). Researchers and policy-makers have treated DLPs as a potentially cost-effective lever to address low early-grade reading levels, especially in low- and middle-income countries where teacher shortages and large class sizes constrain traditional instruction (World Bank, 2022).

Concept of Digital Learning Platforms

Digital learning platforms refer to computer-based or mobile technologies used to deliver instructional content, practice activities and assessment feedback to learners. These platforms support early literacy through phonics, reading fluency, vocabulary and comprehension exercises.

Digital learning platforms are increasingly recognised as integral tools for supporting teaching and learning in formal education systems, particularly in contexts where traditional instruction is challenged by limitations in resources, teacher availability, or access to quality learning materials. Conceptually, digital learning platforms encompass a range of software environments designed to deliver, manage, and facilitate educational content and interactions through digital technology (UNESCO, 2023). These platforms can include web-based portals, mobile applications, interactive multimedia content, and Learning Management Systems (LMS) that support instructional delivery, learner assessment, and progress tracking (World Bank, 2022).

At their core, digital learning platforms serve multiple functions beyond simple content delivery. They allow for the integration of interactive elements such as audio, animations, quizzes, and games, which can enhance learner engagement and provide immediate feedback (Vaipoulou et al., 2022). In the context of literacy development, such features are particularly valuable as they allow young learners to engage with phonemic sounds, letters, and words through repeated practice and multimodal representations. This interactive nature aligns with constructivist learning theory, which posits that learners construct knowledge through active engagement with learning materials and through social interaction with instructors or peers (Piaget, 1954; Vygotsky, 1978).

Although the term digital learning platform is broad, several typologies are commonly referenced in the literature. First, institutional LMS or Virtual Learning Environments (VLEs) are digital systems used by schools or education providers to organise curriculum, track student progress, and deliver instructional content (EdTech Hub, 2023). Second, adaptive learning platforms use analytics and algorithm-driven pathways to personalise content based on individual learner performance (World Bank, 2022). Third, mobile educational apps and multimedia tools are designed for specific learning domains, such as early literacy, numeracy, or language acquisition, and are often utilised in early childhood and primary education contexts (Vaipoulou et al., 2022). Finally, national digital learning portals, which are typically developed by Ministry of Education bodies, present curriculum-aligned content for broad use across schools (UNESCO, 2023).

Empirical studies suggest that the effectiveness of digital learning platforms in improving learning outcomes is strongly influenced by the quality of the platform design and its alignment with curricular goals. For example, effective platforms for early literacy incorporate evidence-based phonemic and phonics instruction, clear sound models, and scaffolded progression from letters to words (Bautista, 2024). Such instructional scaffolding enables learners to make incremental progress through structured exposure to literacy skills, which is essential for the development of decoding and reading fluency (Ehri, 2014).

In addition to content quality, the pedagogical integration of digital learning platforms influences their effectiveness. While digital tools can automate repetitive practice and provide individualised feedback, they are most effective when integrated within a broader instructional framework that includes teacher facilitation, guided discussions, and supplementary activities (Childhood Education International, 2021). That is, technology functions as an amplifier of instruction rather than a substitute for teacher-led pedagogy (World Bank, 2022). This perspective is supported by socio-cultural theory, which emphasises that learning is mediated by social interactions and contextualised support from more knowledgeable others (Vygotsky, 1978).

Despite their potential, digital learning platforms face challenges that may limit their impact, especially in low-resource settings. Infrastructure constraints such as limited electricity, inadequate access to devices, and poor Internet connectivity hinder consistent platform use (UNESCO, 2023). Furthermore, disparities in teacher training and digital pedagogical capacity often result in uneven implementation, where technology is available but underutilised or misaligned with instructional practices (EdTech Hub, 2023). These challenges highlight that digital learning platforms are not standalone solutions; rather, their success depends on supportive policy environments, teacher professional development, and systemic infrastructure investments.

In summary, the concept of digital learning platforms encompasses a spectrum of digital technologies and environments designed to support teaching and learning processes. Their interactive features, alignment with learning objectives, and ability to provide personalised feedback position them as promising tools for enhancing early literacy development. However, realising their full potential requires careful integration into pedagogical practice, adequate training for educators, and systemic support to overcome infrastructural constraints. This conceptual understanding sets the foundation for examining the effectiveness of digital learning platforms in the early literacy context of primary schools in Katete District, Eastern Zambia.

Early Literacy Development

Early literacy development involves the acquisition of foundational reading skills such as letter recognition, phonemic awareness, decoding, fluency and comprehension. Mastery of these skills in early grades is critical for later academic success.

Early literacy development refers to the acquisition of foundational language and reading skills that precede and support formal reading and writing proficiency. These foundational competencies typically develop during early childhood and the lower primary school years and include phonological awareness, letter knowledge, vocabulary development, oral language skills, decoding ability, and emergent comprehension skills (Whitehurst & Lonigan, 1998). Early literacy is widely regarded as a critical determinant of long-term academic success, as early reading proficiency strongly predicts later performance across subjects (Snow, Burns, & Griffin, 1998).

Conceptual Foundations of Early Literacy

Early literacy development is grounded in cognitive, linguistic, and socio-cultural theories of learning. From a cognitive perspective, reading acquisition involves the development of phonological processing skills, orthographic mapping, and automatic word recognition (Ehri, 2014). Ehri (2014) argues that children learn to read words by forming connections between graphemes (letters) and phonemes (sounds), a process known as orthographic mapping. This process requires systematic exposure to letter-sound relationships and repeated practice.

Phonological awareness, particularly phonemic awareness, is considered one of the strongest predictors of reading success (National Reading Panel [NRP], 2000). Phonemic awareness enables children to identify, segment, blend, and manipulate sounds in spoken words, forming the basis for decoding written language. Without mastery of these skills, learners struggle to progress from recognizing letters to reading words fluently.

From a socio-cultural perspective, literacy development is influenced by social interaction, language-rich environments, and guided participation (Vygotsky, 1978). Early literacy skills develop through meaningful communication with caregivers and teachers, shared reading experiences, storytelling, and scaffolded instruction. Thus, literacy acquisition is not solely a cognitive process but also a socially mediated activity shaped by environmental and instructional contexts.

Core Components of Early Literacy

Research identifies several interrelated components that form the foundation of early literacy:

Phonological and Phonemic Awareness

Phonological awareness refers to the ability to recognize and manipulate sound structures in spoken language, including rhymes, syllables, and individual phonemes (NRP, 2000). Phonemic awareness, a subset of phonological awareness, specifically involves identifying and manipulating individual sounds in words. Numerous studies demonstrate that instruction in phonemic awareness significantly improves early reading outcomes (Ehri et al., 2001).

Alphabet Knowledge and Letter Recognition

Alphabet knowledge includes recognizing letters and understanding that letters represent specific sounds. Letter knowledge is a strong predictor of early reading development and serves as the foundation for decoding skills (Lonigan, Burgess, & Anthony, 2000).

Decoding and Word Recognition

Decoding involves translating written symbols into spoken language by applying knowledge of letter–sound correspondences. Proficiency in decoding enables learners to read unfamiliar words and is critical for developing reading fluency (Ehri, 2014).

Oral Language and Vocabulary Development

Oral language competence, including vocabulary and syntactic knowledge, significantly influences reading comprehension (Snow et al., 1998). Children with stronger oral language skills are better equipped to understand texts once they can decode them.

Reading Fluency and Comprehension

Fluency refers to the ability to read text accurately, quickly, and with appropriate expression. Fluent reading supports comprehension by freeing cognitive resources for meaning-making (NRP, 2000). Reading comprehension, the ultimate goal of literacy development, requires integration of decoding skills, vocabulary knowledge, background knowledge, and inferencing ability.

The Importance of Early Literacy in Educational Outcomes

Early literacy development has long-term implications for academic achievement and social development. Research indicates that children who do not achieve reading proficiency by the end of Grade 3 are more likely to experience ongoing academic difficulties (Snow et al., 1998). Early reading difficulties often compound over time, leading to widening achievement gaps.

In low- and middle-income countries, including Zambia, early literacy challenges are prevalent due to factors such as large class sizes, limited instructional resources, and insufficient teacher training (World Bank, 2022). Addressing early literacy deficits during the foundational years is therefore critical to preventing long-term educational disadvantage.

Instructional Approaches to Early Literacy Development

Effective early literacy instruction typically combines systematic phonics instruction, opportunities for guided reading, vocabulary development, and interactive language experiences (NRP, 2000). Evidence supports structured literacy approaches that explicitly teach letter–sound relationships while also providing opportunities for meaningful engagement with texts (Ehri et al., 2001).

Recent scholarship highlights the role of technology-enhanced learning environments in supporting early literacy development. Digital tools that incorporate interactive phonics activities, immediate feedback, and repeated practice can reinforce foundational skills when integrated effectively into classroom instruction (Bautista, 2024). However, research consistently emphasises that digital tools are most effective when combined with teacher guidance and structured pedagogy rather than used in isolation (World Bank, 2022).

Early Literacy in the African and Zambian Context

In many Sub-Saharan African countries, early literacy development remains a significant educational challenge. Factors such as multilingual environments, limited exposure to print materials, and infrastructural constraints affect reading acquisition (Piper, Zuilkowski, & Ong'ele, 2016). In Zambia, efforts to improve early grade reading have focused on phonics-based instruction and structured literacy interventions aligned with the Competency-Based Curriculum.

Despite policy efforts, disparities in literacy achievement persist between urban and rural schools. These contextual realities underscore the importance of exploring innovative approaches, including digital learning platforms, to support foundational literacy development in underserved regions such as Katete District.

Early literacy development is a multifaceted process involving cognitive, linguistic, and socio-cultural dimensions. Foundational skills such as phonemic awareness, letter recognition, decoding, vocabulary development, and fluency form the basis for successful reading comprehension. Empirical evidence underscores the importance of systematic instruction and supportive learning environments in fostering literacy growth. Given the centrality of early literacy to long-term academic success, investigating instructional innovations such as digital learning platforms within rural Zambian contexts is both timely and necessary.

Global Studies on Digital Learning and Literacy

International research indicates that digital learning platforms can improve early literacy outcomes when properly designed and implemented. Meta-analyses and systematic reviews show small to moderate gains, especially in phonics and word reading skills.

A growing number of systematic reviews and meta-analyses examine the impact of educational technology on literacy outcomes. The World Bank's 2022 review of EdTech in developing countries synthesised evidence across delivery modes and found that edtech interventions produce heterogeneous but often positive effects on learning when targeted, evidence-based content and sufficient exposure are present (Rodríguez-Segura et al., 2022). In particular, interventions that explicitly scaffold discrete literacy skills (for example, phonics drills with immediate feedback) generate more robust gains than generalized or lightly structured digital activities (Rodríguez-Segura et al., 2022).

Meta-analyses focused on electronic storybooks and interactive e-books report small-to-moderate positive effects on vocabulary and phonological awareness compared with listening to print books or standard classroom practice (Savva, Durham meta-analysis; Listanto, 2025). While these gains are encouraging, systematic reviews caution that effects vary by age, the degree of interactivity, the presence of adult mediation, and whether the digital product aligns with proven instructional sequences (Savva, 20xx; Listanto, 2025).

A 2023 systematic review specifically on reading instruction technologies in developing contexts found that teacher-supported blended approaches where digital tools supplement explicit, teacher-led instruction are more likely to be effective than stand-alone student software (Norman, 2023). This aligns with broader findings that technology amplifies pedagogy when implemented as part of a coherent instructional model rather than as an add-on.

Over the past two decades, a growing body of global research has examined how digital learning technologies affect literacy outcomes for young learners. Systematic reviews and meta-analyses generally report a small to moderate positive effect of educational technology on reading and related literacy skills, but they also emphasise important caveats about implementation, context, and content quality (Ni et al., 2022; Cheung & Slavin, 2011).

Summary of Meta-Analytic Evidence

Meta-analyses synthesising experimental and quasi-experimental studies find that educational technology interventions typically produce modest positive effects on reading outcomes. For example, Ni et al. (2022) analysed 35 qualified K–12 studies and reported a positive effect ($d \approx +0.37$) for technology-assisted reading interventions in China, indicating that well-designed edtech can improve reading performance relative to traditional instruction. Similar earlier syntheses (e.g., Cheung & Slavin, 2011) found small positive effects overall, with larger gains in studies that targeted specific skills (e.g., decoding, fluency) rather than broad comprehension.

A recent, larger meta-analysis across multiple contexts likewise reported notable gains for decoding and language comprehension when technology was used purposefully, while pointing out variability across study designs, intervention types, and contexts (meta-analysis summaries 2023–2024). These findings indicate that effect sizes vary by outcome: interventions focusing on foundational skills (phonics/decoding) tend to show larger and more reliable gains than those aimed primarily at reading comprehension.

What Types of Digital Interventions Work Best?

Global reviews highlight two intervention types with the strongest and most consistent evidence for early literacy gains: (a) structured digital phonics/decoding programs that provide sequenced practice and immediate corrective feedback, and (b) interactive reading apps that combine audio modelling, repetition, and scaffolded tasks

(Norman, 2023; Chuang, 2023). Studies show these approaches help young learners develop letter–sound knowledge and decoding fluency—skills that reliably transfer to improved word reading and oral fluency when integrated with classroom instruction.

Conversely, technology interventions that simply provide textbooks in digital form or rely on passive multimedia without adaptive sequencing produce weaker results. The literature therefore stresses instructional design—not merely device provision—as the key determinant of success (World Bank; EdTech Hub).

Contextual Factors Moderating Impact

Global studies consistently emphasise that edtech is not a panacea: its effectiveness is strongly moderated by implementation fidelity, teacher support, infrastructure, and contextual fit. Reviews in developing-country contexts find that edtech works best where (a) teachers are trained to integrate digital tasks into lessons, (b) content aligns with curriculum and local language(s), (c) device access and power/connectivity are sufficient, and (d) programmes include monitoring and coaching components (Rodríguez-Segura et al., 2022; UNESCO Gateways initiative). Where these conditions are absent, interventions often achieve only limited or short-term gains (Rodríguez-Segura, 2022; UNESCO, 2023).

Researchers have also documented equity risks: if devices and connectivity are unequally distributed, digital programmes can widen rather than narrow existing achievement gaps (World Bank; UNESCO). Programs that include explicit plans for equitable device distribution, offline functionality, and teacher training produce more equitable effects.

Evidence on App-Based and Game-Based Interventions

A growing subliterature examines mobile apps and game-based literacy tools. Systematic reviews (e.g., Booton et al., 2021; Chuang, 2023) report that well-designed reading apps—those incorporating evidence-based phonics sequences, audio modelling, immediate feedback, and scaffolded tasks—can improve emergent literacy skills, engagement, and motivation. However, reviewers warn that app quality varies widely in marketplaces, and many commercially available apps lack pedagogical soundness, rigorous evaluation, or alignment with curricula (Booton et al., 2021; Chuang, 2023).

Longitudinal and Comprehension Outcomes — Gaps in Evidence

While evidence for decoding and fluency is relatively robust, global reviews note limited evidence on long-term impacts and on higher-order outcomes such as reading comprehension and generalised academic achievement. Several recent reviews call for longitudinal and large-scale experimental studies to assess whether digital-assisted gains in early decoding translate into sustained comprehension and schooling outcomes (Ni et al., 2022; Norman, 2023). The consensus is that short-duration interventions can improve specific early skills, but long-term, system-level benefits require sustained use, teacher integration, and curriculum alignment.

Policy Initiatives and Global Coordination

Recognising both potential and risks, international organisations have emphasised quality, access, and governance in their guidance. UNESCO and UNICEF's Gateways to Public Digital Learning initiative promotes government-led platforms that curate and certify quality content, improve discoverability, and support equitable access—an approach that aims to move beyond ad hoc app distribution toward public goods and standards (UNESCO, 2023; UNICEF). Similarly, World Bank guidance stresses evidence-driven investments that combine devices with teacher training, content alignment, and M&E systems (World Bank; EdTech Hub).

Summary and Implications for the Present Study

Global evidence indicates that digital learning technologies can positively affect early literacy—especially phonics, decoding, and fluency—when interventions are well designed and implemented with teacher support and adequate infrastructure. However, outcomes are heterogeneous: impact depends on content quality, pedagogical integration, and contextual factors. The present study in Katete District seeks to build on this global evidence by examining (a) how digital learning platforms are implemented in a rural Zambian setting, (b) the magnitude of gains across specific literacy domains, and (c) the infrastructural, pedagogical, and policy conditions that moderate effectiveness. These local insights will contribute to the growing international conversation about scaling high-quality digital literacy interventions in low-resource contexts.

Digital Learning Platforms in Sub-Saharan Africa

Studies conducted in Sub-Saharan Africa demonstrate positive impacts of digital learning tools on early literacy, particularly when combined with teacher training and adequate infrastructure. However, challenges such as limited electricity and device access persist. Several high-quality evaluations in sub-Saharan Africa and other low-income settings offer actionable lessons.

Digital learning platforms (DLPs) have increasingly been adopted across Sub-Saharan Africa (SSA) as governments, non-governmental organisations and donors seek scalable approaches to improve access to learning and to mitigate persistent learning poverty. These platforms vary from national curriculum portals and school-level Learning Management Systems to adaptive early-grade apps and tablet-based programmes. International agencies and research consortia have documented a rapid expansion of DLP initiatives in Africa, especially since the COVID-19 school closures accelerated interest in remote and blended learning solutions (EdTech Hub, 2020; UNESCO, 2023).

2.5.1 Evidence of impact and prominent programme models

Global and regional evidence indicates that DLPs can produce positive learning gains in specific literacy outcomes — notably phonics, decoding, and fluency — when platforms are well-designed and supported by teacher mediation (Ni et al., 2022; World Bank, 2022). In SSA, rigorous evaluations of a few large-scale programmes have provided encouraging but conditional evidence. For example, tablet-based, adaptive liter-

acy programmes such as the onebillion tablet initiative in Malawi have shown substantial improvements in early literacy and numeracy in pilot and RCT settings (Financial Times coverage of the Malawi rollout; see FT, 2024). Country scans and rapid reviews (e.g., EdTech Hub country reports) suggest that where DLPs incorporate sequenced phonics, localized content and allow for repeated practice with feedback, they can accelerate early-grade gains — particularly in environments where classroom teacher time and printed materials are scarce (EdTech Hub, 2020; World Bank, 2022).

However, the evidence across SSA is heterogeneous: many interventions report modest or mixed results, and positive outcomes are strongly conditioned by implementation fidelity, teacher support, and content quality (Ni et al., 2022; UNESCO, 2023). Meta-analytic evidence from wider contexts reinforces this point: digital interventions targeting specific, narrowly defined skills (e.g., phonics) tend to produce larger effect sizes than broad, comprehension-oriented platforms (Ni et al., 2022).

Typologies and illustrative country examples

DLPs in SSA can be usefully grouped into several categories: (a) national public portals that curate curriculum-aligned content (promoted by UNESCO’s Gateways initiative); (b) adaptive learning systems that personalise practice (used in tablet or offline tablet programmes); (c) app-based interactive readers and phonics tutors aimed at early grades; and (d) LMS/VLE solutions used primarily at secondary or higher education levels (UNESCO, 2023; EdTech Hub, 2020). Country examples illustrate this diversity: Malawi’s tablet programme (onebillion) represents an adaptive-tablet model with strong recent piloting and scaling ambitions (FT, 2024); various EdTech Hub country scans (e.g., Tanzania, Ghana, Rwanda) document mixed landscapes where national portals coexist with NGO-led app pilots and private sector offerings (EdTech Hub, 2020; EdTech Hub country scans).

Key enablers: what helps platforms succeed

- Across SSA, studies and implementation reviews identify several enabling conditions for DLP effectiveness:
- High-quality, evidence-based content (sequenced phonics, accurate audio modelling, scaffolded practice) is essential for early literacy gains (EdTech Hub, 2020; World Bank, 2022).
- Teacher training and ongoing coaching enable teachers to mediate digital activities, integrate digital tasks into lesson sequences, and use platform data to inform instruction (EdTech Hub, 2020).
- Localisation and curriculum alignment — platforms that provide content in learners’ languages and align to national curricula show higher classroom uptake and relevance (UNESCO, 2023).
- Device management and offline capability — given connectivity constraints, offline-capable platforms and robust device maintenance systems (e.g., solar chargers, storage protocols) are frequently cited as practical enablers (EdTech Hub, 2020; World Bank, 2022).

- These enablers are consistent across international reviews and Sub-Saharan case studies: technology amplifies good pedagogy but rarely substitutes for it (World Bank, 2022; UNESCO, 2023).

Structural constraints and common challenges

Despite potential benefits, DLPs in SSA face substantial structural and systemic barriers:

Digital infrastructure: unreliable electricity, low Internet penetration, and high data costs limit consistent access to cloud-based platforms and raise operating costs for schools (Afrobarometer policy analysis; World Bank, 2022).

Device scarcity and maintenance: many programmes operate with few devices per class, leading to sharing arrangements that limit individual practice time. Lack of local maintenance capacity further reduces device uptime (EdTech Hub, 2020).

Teacher readiness: limited pre-service and in-service training in digital pedagogy constrains teachers' ability to use platforms effectively; teachers may under-utilise or misalign digital tasks without adequate professional development (EdTech Hub, 2020; van der Merwe et al., 2023).

Content quality and language: many commercial apps are not localized or aligned with local languages and curriculum sequences, reducing transfer to classroom assessments (UNESCO, 2023).

Sustainability and financing: pilot projects often rely on donor funding; long-term government budgets and sustainable maintenance plans are frequently lacking, threatening scale and continuity (World Bank, 2022).

Systematic reviews of e-learning implementation in SSA emphasise that these factors, when unaddressed, produce patchy outcomes and can undermine the promise of DLPs (van der Merwe et al., 2023).

Equity and risk of widening gaps

A major concern in the SSA context is equity. Unequal access to devices and connectivity can exacerbate existing urban-rural and socioeconomic disparities if digital programmes are rolled out without deliberate inclusion strategies (World Bank, 2022; UNESCO, 2023). Reviews thus stress offline designs, community-based access points, targeted device distribution, and integrating DLPs into universal schooling plans to reduce the risk of widening the digital divide (Afrobarometer; UNESCO, 2023).

Recent innovations and promising practices

Recent practice in SSA points to several promising approaches that attempt to mitigate constraints: solar-powered tablet deployments, offline content distribution systems (e.g., local servers or preloaded tablets), teacher cohorts for peer coaching, and government-led content curation via national portals under Gateways (UNESCO, 2023; Africa

EdTech 2030 vision). Pilot results from adaptive tablet interventions (e.g., Malawi) show that high-quality, context-appropriate tablets combined with teacher engagement can deliver large early gains, though questions remain about cost, scale, and long-term sustainability (FT, 2024; World Bank, 2022).

Research gaps and implications for the present study

Despite growing attention, several gaps remain in the SSA evidence base. There is limited long-term, longitudinal evidence showing whether early gains from DLP exposure translate into sustained comprehension and later schooling outcomes. Comparative studies across different delivery models (online vs. offline; app vs. LMS) are scarce, as are evaluations that rigorously measure cost-effectiveness at scale (Ni et al., 2022; van der Merwe et al., 2023). For Zambia and Katete District specifically, local evidence on how national policies, district education structures, and school-level practices interact to produce (or limit) DLP impact is thin. Consequently, context-rich case studies — like this thesis — can make valuable contributions by documenting implementation fidelity, teacher mediation, device logistics, and localized learning outcomes.

ABRACADABRA (ABRA) evaluations

ABRACADABRA (ABRA), an interactive web-based early literacy programme, has been evaluated in multiple contexts including Kenya where both randomized and quasi-experimental studies showed statistically significant improvements in phonics, word reading and early comprehension when ABRA was integrated with teacher professional learning and classroom activities (Abrami et al., 2014; Concordia reports 2014 & 2016). The Kenyan studies emphasise that ABRA's benefits were magnified when teachers received ongoing pedagogical coaching and when classroom time protected frequent software use (Abrami et al., 2014). These findings demonstrate a replicable pattern: software alone helped but was substantially more effective within a teacher-support model.

Tablet Programmes (Malawi and other pilots)

Tablet-based programmes in Malawi and pilot projects in neighboring countries showed promising early results on decoding and fluency, leading some governments to consider scaling tablet initiatives (CE or Malawi program reports). However, large-scale rollout studies highlighted operational challenges device maintenance, charging infrastructure, and teacher workload that constrained long-term impact unless accompanied by systemic supports (CE/Malawi reports; Profuturo Observatory summary).

Dose-response and usage analytics

Several evaluations that had access to platform usage logs found dose-response relationships: learners with higher engagement (more minutes, more completed activities) experienced larger gains on decoding and word reading measures (World Bank review; platform log analyses). This evidence supports the argument that both content quality and adequate exposure are necessary for measurable literacy improvement (Rodríguez-Segura et al., 2022).

Implementation and contextual moderators

Effectiveness of DLPs depends critically on implementation and context. The literature identifies five recurring moderators:

Content design and pedagogical alignment

DLPs that implement structured, evidence-based sequences (phonics-first approaches, scaffolded decoding, and progressively complex passages) yield larger gains than platforms founded primarily on gamification without explicit literacy progression (Norman, 2023; World Bank, 2022). Localization including language of instruction and cultural relevance is especially important in multilingual contexts like Zambia where mother-tongue instruction in early grades can support comprehension and transfer to English.

Teacher capacity, beliefs and coaching

Teacher training that integrates technical operation with pedagogical integration and classroom routines is consistently associated with better fidelity and stronger learning outcomes (Abrami et al., 2014; IDRC reports). Professional learning networks, in-class coaching, and follow-up visits help teachers adopt blended lesson designs in which the DLP augments rather than replaces teacher-led instruction.

Infrastructure and device management

Reliable electricity, safe storage, device maintenance workflows and internet access (when required) are practical preconditions for sustained use. Program reports from Zambia and other SSA countries document the digital divide: without infrastructure investment, DLP use tends to be intermittent and concentrated in better-resourced schools (ZANEC, UNICEF reports).

Exposure (frequency and duration)

Many studies point to necessary exposure thresholds. Short, irregular sessions rarely yield measurable gains; conversely, structured daily or multiple-weekly practice sessions over several months correlate with measurable improvements on foundational skills (World Bank, 2022; Profuturo summary).

Equity and home environment

Household support, parental literacy, and access to devices at home influence which children benefit most. Digital interventions that fail to account for home inequities risk reinforcing existing learning gaps unless school-based exposure is prioritized and accompanied by community engagement strategies. Regional assessments emphasise the need to measure SES and home support to interpret programme effects.

Conclusion

In Sub-Saharan Africa, digital learning platforms present both opportunity and challenge. When platforms offer high-quality, localized content, and when implementation includes teacher training, device management, and curriculum alignment, DLPs can

support improvements in foundational literacy skills. Yet systemic constraints (infrastructure, training, and financing) and equity risks mean that impact is uneven. These regional lessons frame the present study's focus: assessing not only whether DLPs improve early literacy in Katete District but also under what conditions, for whom, and with what sustainability prospects.

Digital Learning Platforms in Zambia

Zambia has introduced various digital education initiatives aimed at improving learning outcomes. While pilot studies show promising results, evidence on effectiveness in rural districts such as Katete remains limited. Zambia's Ministry of Education has officially recognised ICT and e-learning in policy documents and experimented with open/innovative schooling and e-learning pilots (Ministry of Education reports; Education Statistics Bulletin). Country-level reports by ZANEC and UNICEF highlight the potential of digital approaches but also document infrastructure constraints and the 'digital divide' exposed during COVID-19 school closures (ZANEC, 2023; UNICEF AMEP report). Local theses and program evaluations report promising teacher and learner engagement in pilot sites but caution that evidence is often short-term and not yet widely generalisable (Mphande, 2024; Lufungulo, 2015). These findings underscore the need for district-level mixed-methods evaluations in rural provinces such as Eastern Province where Katete is located.

The integration of digital learning platforms into Zambia's education system has gained increasing attention over the past two decades, particularly as a strategy to improve access, equity, and quality of learning. Digital learning platforms in Zambia include e-learning portals, mobile learning applications, tablet-based instructional programmes, radio-digital hybrids, and computer-assisted learning systems implemented by the government, non-governmental organisations, and private sector providers. These platforms are viewed as potential tools for addressing persistent challenges in foundational literacy, especially in early grades where reading outcomes remain low in many parts of the country (Ministry of General Education, 2019; World Bank, 2022).

Digital learning platforms (DLPs) have become central to Zambia's recent efforts to expand access to curriculum materials, support continuity of learning after COVID-19 disruptions, and strengthen teacher professional development. The Zambian government, together with international partners and local private providers, has pursued a combination of national portals, partner-supported platforms, and commercial/NGO initiatives to provide curriculum-aligned digital content and remote learning options (Ministry of General Education, 2020; EdTech Hub, 2023).

National initiatives and major platform rollouts

A key milestone in Zambia's national edtech landscape was the Ministry of General Education's e-Learning and Smart Revision portal launched in response to school closures and the need for remote learning infrastructure (Ministry of General Education, 2020). This platform aimed to host syllabus-aligned lessons and revision materials for primary and secondary learners and acted as a first step toward institutionalising digital

content provision. Empirically, UNICEF's Learning Passport was introduced in Zambia in November 2022 as a government-partnered, curriculum-adaptable platform designed to reach marginalized and out-of-school learners; it offers audio and text lessons, teacher guides, and learning resources intended to be inclusive of learners with disabilities (UNICEF, 2022).

Following platform rollouts, partnership models emerged to increase connectivity and access. For example, UNICEF partnered with Airtel Networks Zambia in 2024 to provide free access to the Learning Passport and to accelerate school connectivity, explicitly targeting inclusion for differently-abled learners and remote communities (UNICEF & Airtel, 2024). Such public-private partnerships have become a visible mechanism for reducing data-cost barriers and expanding platform uptake at scale.

Civil society, private sector, and start-ups

Beyond government portals and international platforms, Zambian civil-society organisations, startups, and private edtech firms have developed local DLP solutions. The Zambia National Education Coalition (ZANEC) and other local education actors have documented a variety of commercial and locally developed e-learning products (e.g., iSchool, eSchool360) that aim to align content with the Zambian curriculum and sometimes offer local-language support (ZANEC, 2023). These initiatives indicate a growing domestic market for localized content, but they also highlight variation in scale, quality assurance, and long-term sustainability across providers.

Evidence on reach, usage, and early impacts

Available evidence from reports and pilot documentation suggests that national platforms have expanded reach but that usage patterns and learning impacts vary. UNICEF reported rapid increases in user counts for the Learning Passport Zambia after launch, demonstrating potential for scale when combined with connectivity partnerships (UNICEF, 2023–2024 reporting). However, independent studies and university dissertations indicate uneven teacher and learner engagement with government e-learning portals, with constraints linked to device availability, digital literacy among teachers, and intermittent power/connectivity (Mphande, 2024; ZANEC, 2023). These mixed implementation outcomes mirror regional findings that digital platforms can support learning when accompanied by teacher capacity building and infrastructural supports (EdTech Hub, 2023; World Bank, 2022).

Implementation constraints observed in Zambia

Several recurring constraints limit the potential of DLPs in Zambian primary schools:

Infrastructure and connectivity: Many rural schools continue to experience unreliable electricity and limited Internet connectivity, which undermines consistent use of cloud-based platforms (ZANEC, 2023). Without affordable connectivity solutions or offline functionality, teachers and learners cannot dependably access digital resources.

Device availability and management: Device ratios remain low in many schools; where devices exist they are often shared, limiting individualised practice time for early-grade learners (ZANEC, 2023). Maintenance and repair pathways for devices are frequently ad hoc, affecting sustainability.

Teacher preparedness and professional development: Studies in Zambia report that teachers require more targeted pre-service and in-service training in digital pedagogy and platform use; without pedagogical integration, platforms risk being used for passive consumption rather than structured literacy practice (Mphande, 2024).

Content quality and localization: While some Zambian and partner platforms include curriculum-aligned materials and local language options, gaps remain in adapting content to classroom realities and assessment frameworks (ZANEC, 2023; EdTech Hub, 2023).

These implementation constraints are consistent with broader regional reviews showing that infrastructure, teacher support, and localization determine whether DLPs translate into measurable literacy gains (World Bank, 2022; EdTech Hub, 2023).

Equity, inclusion, and policy responses

Zambia's policy and programmatic responses have increasingly foregrounded inclusion. UNICEF's Learning Passport rollout explicitly emphasises accessibility for out-of-school children, learners with disabilities, and marginalized groups, and partnerships with telecom providers (e.g., Airtel) have sought to remove connectivity cost barriers (UNICEF & Airtel, 2024). National policy documents and Ministry portals also reference efforts to integrate digital content into formal curricula and to support teachers with digital resources; however, operationalising equitable access at district and school levels remains a work in progress (Ministry of General Education, 2020; ZANEC, 2023).

Synthesis and implications for this study

The Zambian experience to date suggests that while digital learning platforms have been launched and scaled in partnership with international agencies and private actors, their effectiveness in improving early literacy depends critically on contextual supports. For a district-level evaluation in Katete, this evidence implies the need to examine not only learner outcomes (e.g., pre- and post-test literacy scores) but also practical implementation variables: device access, electricity/connectivity, teacher training and attitudes, content alignment to the Competency-Based Curriculum, and the presence of enabling partnerships (e.g., telecom or NGO support). Documenting these factors at school and district levels will provide actionable insights on whether and how DLPs improve early literacy in rural Zambian contexts.

Policy Framework Supporting Digital Learning in Zambia

Zambia's commitment to the integration of information and communication technologies (ICTs) in education is articulated in several national policy documents. The

Education Policy (Educating Our Future) and subsequent ICT in Education policies emphasise the use of technology to enhance teaching and learning at all levels, including primary education (Ministry of Education, 1996; Ministry of General Education, 2019). These policies promote the use of digital content, teacher professional development in ICT, and partnerships with private and development actors to expand digital learning opportunities.

More recently, the COVID-19 pandemic accelerated the adoption of digital learning platforms in Zambia, exposing both their potential and limitations. During school closures, the government and partners expanded e-learning portals, radio and television lessons, and mobile-based learning platforms to ensure continuity of learning (UNESCO, 2021). This period highlighted the relevance of digital platforms for early literacy support, but also revealed significant inequalities in access to devices, electricity, and connectivity, particularly in rural districts.

Digital learning in Zambia is supported by an evolving set of national policies, ministry strategies, and partner initiatives that together create the formal enabling environment for introduction, scaling and governance of digital learning platforms (DLPs). This policy framework spans national ICT policy instruments, education sector strategies, curriculum reforms that signal pedagogical priorities, and concrete platform rollouts implemented in partnership with international agencies and the private sector.

2.9.1 National ICT and digital policy instruments

Zambia's national ICT policy trajectory provides the macro-level mandate for using information and communications technologies across sectors, including education. The country's earlier National ICT Policy (2006) recognised the potential of ICTs to support distance education and e-learning (Education Profiles, 2023). More recently, the Government updated its strategic guidance with the National ICT Policy (2023) which emphasises digital transformation, capacity building, and the integration of ICTs across public services — explicitly including education as a priority sector for digital interventions (Government of the Republic of Zambia, 2023). The updated national policy strengthens the enabling environment for school-level DLP deployment by foregrounding infrastructure, digital skills, and public-private collaboration as national priorities.

Ministry of Education strategies and e-learning platforms

At the sectoral level, the Ministry of General Education (MoGE) has articulated ICT mainstreaming in its strategic planning and policy statements and has taken operational steps to deploy digital learning resources. In response to the COVID-19 school closures and the need for continuity of learning, MoGE launched an e-Learning platform and Smart Revision portal (2020) to host syllabus-aligned lessons and revision materials for primary and secondary learners (Ministry of General Education, 2020). This action demonstrated the ministry's willingness to adopt DLPs as part of national service delivery.

Further, Zambia's adoption and rollout of the Competency-Based Curriculum (CBC) (developed 2013–2017 and progressively implemented) provides curricular impetus for using interactive and learner-centred resources; DLPs that align with CBC competencies are therefore more likely to be accepted and adopted at classroom level (Zambia Education Curriculum Framework, 2013). In short, ministry strategy and curriculum reform combine to create both the technical and pedagogical basis for digital learning.

International partnerships and national platform adoption

International development partners have played a catalytic role in advancing DLPs in Zambia. A prominent example is the Learning Passport initiative, implemented in Zambia with UNICEF support and officially launched in 2022. The Learning Passport provides curriculum-adaptable, multimedia lessons, teacher guides and assessment tools, and is designed to be accessible on low-end devices and in low-bandwidth contexts (UNICEF, 2022). To improve access and address data-cost barriers, UNICEF and telecom partners (e.g., Airtel Zambia) have entered into partnerships to provide zero-rated or subsidised access to the platform for learners and teachers (UNICEF & Airtel, 2024). These public–private partnership models are central to national efforts to scale DLPs in contexts where connectivity and data costs would otherwise limit uptake.

Civil society, research evidence and policy monitoring

Civil society organisations and research institutes in Zambia have contributed to policy monitoring and evidence generation. For example, the Zambia National Education Coalition (ZANEC) has documented the status of education technology and digital literacy among teachers, learners and parents, highlighting gaps in device access, teacher readiness, and infrastructure (ZANEC, 2023). Academic research (e.g., university theses and policy briefs) has evaluated early e-learning initiatives and identified critical implementation barriers (Mphande, 2024). Such locally generated evidence is important for informing ministry decisions and for adapting national policy to district realities.

Teacher professional development and institutional capacity

Policy documents and programme reports emphasise teacher capacity building as a core component of digital learning scale-up. The MoGE and partner programmes have included teacher training modules and resources to improve digital pedagogy, although independent assessments indicate that coverage and depth of training remain uneven across districts (EdTech Hub, 2023; ZANEC, 2023). The policy framework thus recognises the need for professional development, but national systems for sustained in-service training, mentoring, and monitoring are still under development.

Governance, financing and sustainability mechanisms

Zambia's policy framework promotes multi-stakeholder financing and public-private partnerships to support digital learning. National ICT policy documents and education strategies encourage collaboration with the private sector (telecoms, platform providers) to address infrastructure and service-delivery gaps (Government of the Re-

public of Zambia, 2023). Pilot projects funded by donors or NGOs have provided devices and connectivity in selected districts; however, long-term sustainability and recurrent costs (device maintenance, data provision, software licensing) remain a central policy concern that needs clearer budgetary commitments from government at national and district levels (World Bank; EdTech Hub, 2022–2023).

Policy gaps, implementation challenges and equity considerations

Although Zambia's policy environment is increasingly supportive of digital learning, key gaps and challenges persist that affect practical implementation:

- Infrastructure and connectivity gap: Many rural schools lack reliable electricity and adequate Internet connectivity, limiting the practical usability of cloud-based DLPs (ZANEC, 2023). Policy documents like the National ICT Policy (2023) commit to addressing digital infrastructure but operational roll-out at scale is ongoing (Government of the Republic of Zambia, 2023).
- Teacher readiness and systemic training: While policy recognises teacher training as critical, the scale and continuity of in-service training for digital pedagogy are inadequate in many districts (EdTech Hub, 2023).
- Device provisioning and maintenance: National policy encourages device distribution through partnerships, but device:learner ratios and plans for maintenance and replacement are often weak at district level (ZANEC, 2023).
- Curriculum and language alignment: Ensuring that DLP content aligns with the Competency-Based Curriculum and is available in appropriate local languages remains an implementation priority (MoGE; EdTech Hub).
- Funding sustainability: Reliance on donor projects or one-off donations undermines predictable financing; the policy framework calls for public budget allocation but many districts lack dedicated funds (World Bank; ZANEC).
- These gaps have equity implications: without targeted policy actions to reach remote and disadvantaged schools, DLPs risk entrenching existing urban–rural divides in access to learning resources (UNICEF, 2022; ZANEC, 2023).

Implications for district-level studies (Katete District)

For a district-level evaluation in Katete, the national policy framework suggests the following analytical priorities: (a) map how national platforms and policies (e.g., Learning Passport, MoGE e-learning portal) are operationalised at district and school levels; (b) examine whether teacher training and curricular alignment mandated at central level translate into classroom practices; (c) analyse financing and partnership arrangements (e.g., any Airtel or NGO support) that affect device availability and internet access; and (d) assess equity outcomes by disaggregating access and usage by school location, socio-economic indicators and language of instruction. Understanding these policy-to-practice linkages will be essential for interpreting the effectiveness of DLPs in early literacy within Katete District and for making context-sensitive recommendations.

Types of Digital Learning Platforms Used in Zambia

Digital learning platforms used in Zambia can broadly be categorised into school-based and home-based systems. School-based platforms include computer laboratories,

tablet-assisted learning programmes, and interactive digital content used under teacher supervision. These are often supported by donor-funded initiatives or public–private partnerships and are typically aligned with the national curriculum. Home-based platforms include mobile applications and online resources accessed by learners outside school, often dependent on parental support and household resources (ZANEC, 2023).

In the context of early literacy, several platforms focus on phonics, reading fluency, vocabulary development, and basic comprehension through multimedia content such as audio narration, animations, and interactive exercises. While these platforms are designed to supplement classroom instruction, their effectiveness varies widely depending on implementation conditions and contextual factors.

Digital learning platforms (DLPs) in Zambia manifest in several distinct forms that reflect differing pedagogical goals, delivery constraints, and institutional sponsorship. Broadly, the platforms used in the Zambian context fall into five categories: (a) national/state portals and public platforms; (b) tablet-based/offline adaptive systems; (c) commercial and locally developed app/platform providers; (d) broadcast and low-bandwidth multimedia solutions; and (e) teacher professional-development and management platforms. Each type has characteristic features, strengths, and limitations in relation to early-grade literacy provision.

National portals and public platforms

National portals are government-endorsed, curriculum-aligned sites or services intended for wide reach and to act as public goods. In Zambia, the Ministry of General Education (MoGE) developed an E-Learning and Smart Revision portal during the COVID-19 school closures to host syllabus-aligned lessons and revision material for learners across primary and secondary levels (Ministry of General Education, 2020). Another major public partnership is the Learning Passport, a UNICEF-supported platform adapted for Zambia that provides curriculum-mapped lessons, teacher guides, and inclusive accessibility features; UNICEF’s partnership with telecom providers (e.g., Airtel) has been used to increase zero-rated access to the Learning Passport for learners and teachers (UNICEF, 2022; UNICEF & Airtel, 2024). National portals aim to maximise coverage and curriculum coherence but depend heavily on national coordination, device access, and connectivity to be fully effective (Ministry of General Education, 2020; UNICEF, 2022).

Tablet-based and offline adaptive systems

In contexts where Internet connectivity is unreliable, tablet-based and offline systems have been prominent. These solutions typically preload structured, sequenced learning software on durable tablets (often with solar charging options) so that learners can access interactive lessons offline. International examples—such as onebillion’s onecourse/onetab model—have been implemented at scale in southern Africa and provide offline, adaptive literacy and numeracy learning that is localized into learners’ languages (onebillion, n.d.; UNESCO, BEFIT initiative). In Zambia, similar tablet initiatives and localized tablet deployments (for example, programmes piloted by private

providers and NGOs) have been used to reach remote schools where connectivity is limited (Impact Network; ZANEC, 2023). Tablet systems are effective for structured phonics and decoding practice but require strong device management and maintenance plans for sustainability (onebillion, n.d.; EdTech Hub, 2020).

Commercial and locally developed apps/platforms

A growing suite of private and locally developed DLPs exists in Zambia. Start-ups and regional companies (previously operating under names such as iSchool, later re-branded as Mwabu) provide tablet-based multimedia content aligned to curricula and packaged for classroom or home use (Mwabu/iSchool, 2022; ZANEC, 2023). These providers often offer teacher dashboards, pupil activities, and administrative solutions (e.g., iSchool Management). While commercial platforms can offer polished interfaces and flexible product models, quality and curricular alignment vary. Local actors play an important role in language localisation and context-appropriate content, but scaling such services sustainably depends on partnerships and financing (ZANEC, 2023; Mwabu, 2022).

Broadcast and low-bandwidth multimedia solutions

Where device ratios and Internet access are limited, broadcast media provide an alternative delivery channel. In Zambia, the national broadcaster (ZNBC) and telecom/corporate partners have supported TV and radio lessons, and the MoGE's e-learning ecosystem has included low-bandwidth materials and smart revision content (Sintema, 2020; Ministry of General Education, 2020). Broadcast solutions are inclusive by design and can reach learners in households without Internet access, but they are primarily one-way and require complementary teacher-led or family-led activities to develop interactive literacy skills.

Teacher professional-development and management platforms

Some platforms focus on teacher capacity building, curriculum management, and administrative functions. These include learning management systems (LMS) used by schools and district offices and platforms for teacher learning that host pedagogical modules and communities of practice. MoGE and partners have emphasised teacher training as an essential companion to any content platform; however, independent reports find that in-service coverage and depth remain uneven across districts (EdTech Hub, 2023; ZANEC, 2023). Teacher platforms are central to ensuring that digital literacy activities are pedagogically integrated into classroom practice and that data from pupil-facing platforms inform instruction.

Key implementation characteristics and challenges across platform types

Across these platform types in Zambia, several cross-cutting realities shape usage and impact:

- Connectivity and offline capability: Platforms that can function offline (preloaded tablets or local servers) are more practical in rural settings where Internet access and electricity are unreliable (onebillion, n.d.; EdTech Hub, 2020).

- Curriculum alignment and localization: Platforms aligned to the Competency-Based Curriculum and localized to learners' languages are more likely to be used by teachers and to support transfer to classroom assessments (Ministry of General Education, 2020; ZANEC, 2023).
- Teacher facilitation and training: Even the best DLPs require teacher mediation to connect digital practice with comprehension and classroom activities; limited teacher training constrains effectiveness (EdTech Hub, 2023).
- Device management and sustainability: Tablet and device initiatives raise issues of maintenance, replacement, and costs; projects that lack robust maintenance plans suffer high downtime (ZANEC, 2023).
- Public-private partnerships: Partnerships (e.g., UNICEF-Airtel) help reduce data cost barriers and scale access but require clear governance and sustainability planning (UNICEF & Airtel, 2024).

Implications for early-grade literacy in Katete District

For early literacy, platform types that emphasise structured, sequenced phonics, audio modelling, and repeated practice (often found in tablet-based offline software or well-designed early-grade apps) are most promising for improving foundational decoding skills. However, their success in Katete District will depend on whether device access, teacher training, and curriculum alignment are adequately addressed. National portals and broadcast media can broaden reach but should be paired with teacher-mediated classroom activities to support comprehension and transfer (UNICEF, 2022; EdTech Hub, 2020).

Empirical Studies on Digital Learning Platforms in Zambia

Empirical research on digital learning platforms in Zambia remains limited, particularly at the early primary level. Available studies and postgraduate theses suggest that digital platforms have the potential to enhance learner engagement and motivation, especially among young learners who respond positively to interactive and audio-visual content (Lufungulo, 2015; Mphande, 2024). Teachers often report increased learner interest and participation during digital literacy lessons compared to traditional chalk-and-talk approaches.

However, evidence on measurable literacy gains is mixed. Some pilot studies report improvements in basic reading skills such as letter recognition and word reading, while others find minimal impact due to irregular platform use, inadequate teacher training, and infrastructure challenges (ZANEC, 2023). These findings indicate that access to digital platforms alone is insufficient to guarantee improved literacy outcomes.

Infrastructure and Equity Challenges

A major constraint affecting the effectiveness of digital learning platforms in Zambia is unequal access to infrastructure. Rural districts, including parts of Eastern Province, face persistent challenges related to unreliable electricity supply, limited internet connectivity, and shortages of digital devices (UNICEF, 2023). As a result, digital learning

initiatives are often implemented inconsistently, reducing learners' exposure to digital literacy content.

These infrastructure disparities raise concerns about equity. Learners in well-resourced urban or peri-urban schools are more likely to benefit from digital platforms than those in rural settings. Without deliberate strategies to address these gaps—such as solar power solutions, offline content, and shared device models—digital learning platforms risk widening existing educational inequalities rather than reducing them.

Teacher Preparedness and Attitudes in Zambia

Teacher readiness is another critical factor influencing the effectiveness of digital learning platforms in Zambia. Studies indicate that while many teachers hold positive attitudes toward the use of technology in education, they often lack adequate training to integrate digital platforms effectively into literacy instruction (Lufungulo, 2015). Limited professional development opportunities, heavy workloads, and insufficient technical support contribute to low confidence and underutilisation of digital tools.

Where targeted training and ongoing support are provided, teachers are more likely to use digital platforms regularly and align them with literacy objectives. This underscores the importance of capacity building as a central component of digital literacy initiatives in Zambian primary schools.

Digital Learning Platforms and Early Literacy Outcomes

In relation to early literacy development, digital learning platforms in Zambia show promise in supporting phonemic awareness, pronunciation, and listening skills through audio-supported activities. Such features are particularly beneficial for learners who have limited exposure to print materials at home. However, the development of higher-order skills such as reading comprehension requires guided instruction and interaction with teachers, suggesting that digital platforms are most effective when used as part of blended learning approaches rather than as substitutes for classroom teaching (World Bank, 2022).

Factors Affecting Effectiveness of Digital Learning Platforms

Key factors influencing effectiveness include teacher competence, learner engagement, infrastructure availability, content quality and administrative support.

The effectiveness of digital learning platforms (DLPs) in enhancing early literacy development is not determined solely by the availability of technology. Rather, it is influenced by a complex interaction of pedagogical, technological, institutional, and socio-cultural factors. Existing literature indicates that digital platforms yield positive literacy outcomes only when critical enabling conditions are present (Rodríguez-Segura et al., 2022; Norman, 2023).

Teacher Competence and Pedagogical Integration

Teacher competence is one of the most significant determinants of the effectiveness of digital learning platforms. Studies consistently show that digital tools are most effective when teachers are adequately trained to integrate them into daily literacy instruction rather than using them as stand-alone or occasional activities (Abrami et al., 2014). Teachers require both technical skills (operating devices and software) and pedagogical skills (aligning digital activities with literacy objectives such as phonics, decoding, and comprehension). Where teachers lack confidence or training, digital platforms tend to be underutilized or misapplied, limiting their potential impact on learners' literacy development (Norman, 2023).

Quality and Relevance of Digital Content

The instructional quality of digital learning content significantly affects literacy outcomes. Platforms that are grounded in evidence-based literacy instruction—particularly those emphasizing phonemic awareness, systematic phonics, and gradual progression from simple to complex texts—have been found to produce stronger learning gains (Gove & Wetterberg, 2011). Additionally, content relevance to learners' cultural and linguistic contexts enhances engagement and comprehension. In multilingual contexts such as Zambia, platforms that fail to accommodate local languages or learners' prior experiences may be less effective in supporting early literacy acquisition (UNESCO, 2021).

Learner Engagement and Motivation

Learner engagement plays a critical role in determining the success of digital learning platforms. Interactive features such as animations, audio feedback, and gamified activities can increase learners' motivation and time-on-task, which are essential for early literacy skill development (Hirsh-Pasek et al., 2015). However, excessive gamification without clear instructional focus may distract learners from literacy objectives. Effective platforms balance engagement with structured literacy practice to ensure that enjoyment translates into measurable learning gains.

Access to Infrastructure and Technological Resources

Adequate infrastructure is a prerequisite for the effective use of digital learning platforms. Reliable electricity, sufficient digital devices, secure storage, and, where applicable, internet connectivity are essential for consistent implementation (World Bank, 2022). In many rural and peri-urban schools in Zambia, intermittent power supply and limited access to devices restrict the frequency and duration of digital learning activities. Such constraints reduce learners' exposure to digital literacy content and weaken the potential impact of the platforms.

Frequency and Duration of Platform Use

The frequency and duration of learners' interaction with digital learning platforms—often referred to as exposure or dosage—significantly influence learning outcomes. Research indicates that short, irregular use of digital platforms rarely produces substantial literacy gains, whereas consistent and sustained use over several weeks or months leads

to improvements in foundational literacy skills (Rodríguez-Segura et al., 2022). Effective implementation therefore requires structured timetabling and integration of digital activities into regular literacy lessons.

School Leadership and Institutional Support

Supportive school leadership enhances the effectiveness of digital learning platforms by promoting positive attitudes toward technology use, allocating resources, and monitoring implementation. Headteachers who prioritize digital literacy initiatives, encourage teacher collaboration, and facilitate professional development create an enabling environment for effective platform use (Fullan, 2013). Conversely, lack of administrative support often results in poor coordination, minimal supervision, and eventual abandonment of digital interventions.

Learner Background and Home Environment

Learners' socio-economic background and home literacy environment also influence the effectiveness of digital learning platforms. Children from homes with limited literacy support may benefit more from school-based digital interventions, provided that exposure is sufficient and well structured (UNICEF, 2023). However, disparities in parental support, language exposure, and access to technology at home can moderate learning outcomes and contribute to unequal benefits among learners.

Monitoring, Assessment, and Feedback Mechanisms

Effective digital learning platforms incorporate monitoring and feedback systems that allow teachers to track learner progress and adjust instruction accordingly. Usage analytics, progress dashboards, and formative assessments help identify learners who require additional support and ensure that digital instruction aligns with learning goals (OECD, 2021). Where such monitoring mechanisms are absent or underutilized, opportunities for targeted literacy support are lost.

Summary

In summary, the effectiveness of digital learning platforms in early literacy development depends on multiple interrelated factors, including teacher competence, content quality, learner engagement, infrastructure availability, frequency of use, school leadership, learner background, and monitoring mechanisms. Understanding how these factors interact within specific contexts such as primary schools in Katete District is essential for evaluating the true impact of digital learning platforms and for informing evidence-based policy and practice.

Theoretical Framework

This study was guided by cognitive learning theory and socio-constructivist theory, which emphasize skill acquisition and social interaction in learning. These frameworks support the integration of digital tools in literacy instruction.

Based on the literature, the study applied a conceptual framework linking:

- Inputs: DLP content quality, device availability, teacher training, infrastructure (electricity, internet), parental support;

- Processes: classroom integration (frequency, fidelity), learner engagement (time-on-task);
- Outputs: early literacy gains (letter knowledge, phonemic awareness, decoding, fluency, vocabulary, comprehension);
- Moderators: SES, initial literacy levels, teacher experience, local language of instruction.

This combined cognitive + socio-technical framing aligns with the strongest evidence base and guides both measurement choices and analysis.

Cognitive-skill acquisition frameworks

Rooted in evidence on how children learn to read, these frameworks prioritise explicit instruction in discrete components (phonemic awareness → decoding → fluency → comprehension) and predict that interventions concretely targeting these processes will improve measurable outcomes (Gove & Wetterberg, 2011). Many DLPs are intentionally designed to operationalise these sequences and their evaluation commonly measures the same discrete skills.

Socio-technical / socio-constructivist frameworks

These emphasise that technology-mediated learning emerges from interactions among the learner, teacher, community, and institutional structures. They foreground teacher agency, local adaptation, and the role of affordances (what the technology allows teachers and learners to do) — which explains why identical software can produce different results across schools (Abrami et al., 2020; Norman, 2023). Combining these frameworks helps evaluators measure both skill gains (outcomes) and process variables (fidelity, teacher practice, infrastructure) that explain why gains occur or not.

Methodological strengths and weaknesses in the literature

The evidence base contains both strengths and limitations that inform the design of the present study:

Strengths

- Increasing number of randomized and quasi-experimental evaluations with standardized early-grade instruments (e.g., EGRA variants) supports comparative inference (Abrami et al.; World Bank review).
- Rich program data (usage logs, classroom observations) enable dose-response analyses.

Weaknesses

- Many evaluations are small, short-term pilots; few studies follow cohorts beyond one academic term to assess sustainability or longitudinal transfer to comprehension.
- Variability in outcome measures, inconsistent reporting of fidelity metrics, and limited baseline reporting sometimes complicate cross-study synthesis.

- Context specificity: many African evaluations are in peri-urban or better-resourced pilot sites, limiting generalisability to more remote rural districts.

These strengths/weaknesses justify a mixed-methods, quasi-experimental case study that pairs standardized learner assessments (pre/post EGRA-style instruments), usage analytics, and qualitative implementation research to better explain outcomes in the Katete context.

Research Gaps Relevance to Katete District

Despite growing literature, limited empirical research exists on the effectiveness of digital learning platforms in rural Zambian primary schools. This study sought to fill this gap.

Major gaps highlighted by the literature include:

- District-level, mixed-methods evidence in rural Zambian settings — most published evaluations have not focused on districts like Katete. The present study's case study of three Katete schools directly addresses this gap.
- Linking learner gains to implementation fidelity and contextual moderators — while many studies record usage, fewer systematically triangulate logs, observations, teacher interviews and household variables. This study's mixed-methods design aims to fill that gap.
- Sustainability and practical constraints — scoping for device management, power, teacher workloads and local ownership is under-documented; this study will document these operational factors and provide locally actionable recommendations.

Despite growing interest in digital learning platforms, there is a lack of rigorous, district-level studies evaluating their effectiveness on early literacy outcomes in Zambia. Few studies employ mixed-methods designs that combine learner assessment data with qualitative insights from teachers, headteachers, and parents. Additionally, there is limited evidence focusing on rural districts such as Katete, where contextual factors may differ significantly from urban settings.

This gap justifies the present study, which seeks to evaluate the effectiveness of digital learning platforms in early literacy development through a case study of three selected primary schools in Katete District. By examining both learning outcomes and implementation conditions, the study aims to generate context-specific evidence to inform policy and practice.

Summary and implications for the present study

The chapter reviewed literature on digital learning platforms and early literacy development. It established the need for localized empirical research in Katete District.

The literature indicates conditional effectiveness for DLPs: when content is evidence-based, teacher capacity is built, exposure is sufficient, and infrastructure supports

consistent use, measurable gains in foundational literacy (especially phonics and decoding) are plausible. However, contextual variability means results are not automatically transferable; rigorous local evaluation is needed to inform district-level policy. For Katete District, a mixed-methods case study combining pre/post standardized literacy measures, usage analytics, classroom observation, and interviews with teachers, headteachers and parents is well-justified by the literature and can produce both causal and implementation insights needed by district decision-makers.

Conclusion

This chapter reviewed relevant literature on the effectiveness of digital learning platforms in early literacy development, drawing on global, regional, and Zambian perspectives. The review demonstrated that digital learning platforms have the potential to enhance early literacy skills—particularly foundational competencies such as letter recognition, phonemic awareness, decoding, and oral reading fluency—when they are grounded in evidence-based literacy instruction and implemented within supportive learning environments.

The literature further revealed that the effectiveness of digital learning platforms is highly conditional. Key factors influencing their impact include teacher competence and pedagogical integration, the quality and relevance of digital content, learner engagement, availability of infrastructure and technological resources, frequency and duration of platform use, school leadership support, and learners' socio-economic and home literacy environments. These factors interact to either enhance or constrain the potential benefits of digital learning platforms, especially in low-resource and rural settings.

Evidence from sub-Saharan Africa and Zambia indicates growing interest and investment in digital learning initiatives; however, empirical findings remain mixed. While some studies report increased learner motivation and improvements in basic literacy skills, others highlight persistent challenges such as inadequate teacher training, unreliable electricity, limited access to devices, and uneven implementation across schools. Notably, the review identified a scarcity of rigorous, district-level studies focusing specifically on early literacy outcomes in rural Zambian contexts, including Katete District.

The theoretical perspectives discussed in this chapter—particularly cognitive skill acquisition and socio-constructivist frameworks—underscore the importance of both instructional design and contextual factors in evaluating digital learning interventions. Together, these frameworks provide a useful lens for examining not only whether digital learning platforms improve early literacy outcomes, but also how and under what conditions such improvements occur.

In conclusion, the literature reviewed establishes a strong justification for the present study. By employing a mixed-methods case study approach in three selected primary schools in Katete District, this research seeks to address identified gaps in the literature

by generating localized, empirical evidence on the effectiveness of digital learning platforms in early literacy development. The insights from this chapter therefore inform the research design, instruments, and analytical approach adopted in Chapter Three, which outlines the methodology of the study.

III. Research Design and Methodology

1. Overview

This chapter presents the research methodology employed in the study titled “Examining the Effectiveness of Digital Learning Platforms in Early Literacy Development”: A Case Study of Three Selected Primary Schools namely; Kanyebele Primary School, David Seidenfield Primary School and Nkhunga Primary School of Kanjeza Zone in Katete District, Eastern Province, Zambia. It has outlined the research design, study area, target population, sampling procedures, research instruments, data collection procedures, data analysis methods, validity and reliability measures, ethical considerations, and limitations of the study. The purpose of this chapter is to demonstrate that the study was conducted in a systematic, rigorous, and ethical manner capable of addressing the research objectives and questions.

2. Research Design

A research design refers to the overall plan, structure, and strategy used to conduct a research study. It outlines how the researcher will collect, measure, and analyze data in order to answer research questions or test hypotheses. The research design serves as a blueprint that ensures the study is systematic, logical, and capable of producing valid and reliable findings.

According to John W. Creswell (2014), a research design is “The plan or proposal to conduct research, involving the intersection of philosophy, strategies of inquiry, and specific methods” (p. 5). This definition highlights that research design is not only about methods (such as questionnaires or interviews), but also about the broader approach guiding the study, including the research paradigm (qualitative, quantitative, or mixed methods).

Similarly, William M. K. Trochim (2006) defines research design as “The glue that holds the research project together. A design is used to structure the research, to show how all of the major parts of the research project work together to try to address the central research questions.”

The study adopted a mixed-methods case study design. This design integrates both quantitative and qualitative research approaches in order to provide a comprehensive evaluation of the effectiveness of digital learning platforms in early literacy development.

The quantitative component focused on measuring learners’ early literacy outcomes through baseline and post-intervention assessments, allowing for objective evaluation

of changes in literacy skills. The qualitative component explores teachers' perceptions, experiences, and implementation practices related to the use of digital learning platforms. The case study approach is considered appropriate because it enables an in-depth examination of the phenomenon within its real-life context, particularly in a rural district where contextual factors significantly influence implementation.

The mixed-methods design allows for triangulation of data, thereby enhancing the credibility and depth of the findings.

3. Study Area

A study population refers to the entire group of individuals, objects, or elements that share common characteristics and from which a researcher intends to draw conclusions. It represents the total set of units that meet the criteria for inclusion in a research study. According to William G. Cochran (1977), a population is "The aggregate of all the units to which the investigator wishes to apply the results of the study."

The study was conducted in Katete District, located in Eastern Province of Zambia. Katete District comprises both peri-urban and rural communities and is representative of many districts in the province in terms of educational infrastructure, learner demographics, and access to digital resources. The district was selected due to the presence of primary schools that have introduced digital learning platforms to support teaching and learning. Three primary schools were purposively selected for the study based on their use of digital learning platforms in early grade literacy instruction. The variation among the selected schools in terms of infrastructure, resource availability, and location provided an opportunity for comparative analysis.

4. Target Population

A target population in research refers to the entire group of individuals, objects, or elements that a researcher intends to study and to which the findings of the study will be generalized. It represents the broader group that meets specific characteristics defined by the research objectives. According to Earl Babbie (2010), a population is "The theoretically specified aggregation of study elements." Building on this, the target population is the full set of those elements that the researcher aims to draw conclusions about, even if only a smaller sample is actually studied. Similarly, John W. Creswell (2014) explains that the target population is the group that researchers want to generalize their results to and must be clearly identified in terms of characteristics such as age, location, and other defining features.

The target population for the study consisted of Early-grade learners (Grade 1 and Grade 2 pupils) enrolled in the selected primary schools, Teachers teaching literacy-related subjects in Grade 1 and Grade 2 and School administrators, including head teachers or deputy head teachers, involved in overseeing digital learning initiatives

These groups were considered relevant because they are directly involved in the use, implementation, and outcomes of digital learning platforms in early literacy development.

5. Sample Size and Sampling Procedures

Sample Size

Sample size in research refers to the number of participants, cases, or observations selected from the target population to be included in a study. It determines how much data will be collected and directly influences the reliability, validity, and generalizability of the study findings. According to William G. Cochran (1977), determining sample size is a statistical process aimed at ensuring that the selected sample is large enough to provide accurate estimates of population parameters while minimizing sampling error.

Similarly, John W. Creswell (2014) explains that sample size is the number of individuals in a sample and should be justified based on the research design, type of analysis, and desired level of precision.

The sample included 90 learners (30 learners per school), 9 teachers teaching Grade 1 and Grade 2 and three school administrators (one from each selected school)

The sample size was considered adequate for a case study design and manageable within the available time and resources, while still allowing meaningful analysis.

Sampling Procedures

Sampling procedures refer to the systematic methods used to select a subset (sample) of individuals, cases, or elements from a larger population for the purpose of conducting a study. These procedures ensure that the selected sample adequately represents the population and allows valid conclusions to be drawn. According to Earl Babbie (2010), sampling is “The process of selecting observations.” Similarly, William G. Cochran (1977) explains that sampling procedures are used to obtain a representative group from a defined population in order to make statistical inferences about that population.

Purposive sampling (also called judgmental or selective sampling) is a non-probability sampling technique in which the researcher deliberately selects participants based on specific characteristics, knowledge, or experience relevant to the study. The selection is guided by the purpose of the research rather than random choice. According to Michael Quinn Patton (2002), purposive sampling involves “Selecting information-rich cases for study in depth.” This means participants are chosen because they can provide detailed and relevant information about the phenomenon being investigated. Similarly, John W. Creswell (2014) explains that in purposive sampling, researchers intentionally select individuals who are knowledgeable or experienced with the central phenomenon of the study.

Simple random sampling is a probability sampling technique in which every member of the population has an equal and independent chance of being selected for the study.

Selection is typically done using random number tables, lottery methods, or computer-generated randomization to eliminate bias. According to William G. Cochran (1977), simple random sampling is a method in which each unit in the population has an equal probability of selection, ensuring that the sample is representative of the population. Similarly, Earl Babbie (2010) explains that simple random sampling is a technique where each element of the population has an equal chance of being selected, often achieved through random selection procedures.

Purposive sampling was used to select the three primary schools based on their use of digital learning platforms while Simple random sampling was used to select learners within each grade to participate in the literacy assessment and Purposive sampling was used to select teachers and administrators who were directly involved in early literacy instruction and digital platform implementation.

6. Research Instruments

Research instruments are the tools or devices used by researchers to collect data from participants in a study. These instruments help gather information that addresses the research objectives and questions. Common research instruments include questionnaires, interview guides, observation checklists, tests, and document analysis guides. According to John W. Creswell (2014), research instruments are tools for measuring, observing, or documenting data in a study and must be aligned with the research design and research questions. Similarly, Earl Babbie (2010) explains that data collection instruments are the techniques used to gather empirical data systematically and consistently.

The study employed multiple research instruments to collect both quantitative and qualitative data.

Early Literacy Assessment

A structured early literacy assessment was used to measure learners' literacy skills. The assessment covered; Letter recognition, Phonemic awareness, Word reading/decoding, Oral reading fluency and Reading comprehension.

The assessment was administered as a baseline (pre-test) and post-test to measure changes in learners' literacy performance associated with the use of digital learning platforms.

Teachers' Questionnaire

A structured questionnaire was administered to Grade 1 and Grade 2 teachers to collect comprehensive data on their experiences with digital learning platforms. The questionnaire sought information on the frequency and types of digital learning platforms used in literacy instruction, as well as teachers' perceptions of their effectiveness in enhancing learners' early literacy skills. Additionally, it gathered data on the training and support received by teachers, the challenges encountered during implementation,

and their suggestions for improving the use of digital learning platforms. The instrument included a combination of closed-ended and open-ended items to allow for both quantitative measurement and in-depth qualitative insights.

Interview Guide

An interview guide in research is a structured or semi-structured list of questions, themes, or topics prepared by the researcher to direct the interview process. It ensures that all key issues related to the study objectives are covered while still allowing flexibility for probing and follow-up questions. According to Michael Quinn Patton (2002), an interview guide provides a framework of topics and questions that the interviewer explores during the interview while allowing room for in-depth responses and clarification. Similarly, John W. Creswell (2014) explains that in qualitative research, an interview protocol (or guide) includes open-ended questions and prompts designed to elicit detailed responses from participants about the central phenomenon.

Semi-structured interviews were conducted with school administrators to obtain in-depth information on; School-level support for digital learning platforms, Implementation strategies, Infrastructure and resource challenges and Perceived impact on early literacy development.

Observation Checklist

An observation checklist was used during classroom visits to assess how digital learning platforms were integrated into lessons, to examine learner engagement during digital literacy activities and to assess availability of digital devices for use.

7. Data Collection Procedures

Data collection procedures refer to the systematic steps and processes that a researcher follows to gather information from participants or other sources in order to answer the research questions. These procedures describe how, when, where, and by whom the data will be collected, ensuring consistency, accuracy, and ethical compliance. According to John W. Creswell (2014), data collection procedures involve identifying the types of data to be collected, specifying the instruments used, detailing how participants will be selected, and explaining the steps taken to record and store the information. Similarly, Earl Babbie (2010) explains that data collection refers to the systematic gathering of empirical information in accordance with a research design to answer the study questions.

Data collection for the study was conducted in a systematic and sequential manner. First, official permission and ethical clearance were obtained from the university authorities, the District Education Board Secretary (DEBS), and the administrators of the selected primary schools in Katete District. This ensured that the study was conducted in accordance with institutional and ethical requirements.

Following the approval process, baseline literacy assessments were administered to the selected learners to establish their initial early literacy levels before the intensive

use of digital learning platforms (DLPs). These pre-tests provided benchmark data against which later performance could be compared. Thereafter, questionnaires were distributed to teachers to gather quantitative data on their experiences, perceptions, and challenges related to DLP implementation. The completed questionnaires were collected after respondents had sufficient time to provide their responses.

In addition, classroom observations were conducted during literacy lessons that incorporated digital learning platforms. These observations enabled the researcher to directly examine how DLPs were being used in instructional practice and how learners engaged with the technology. Furthermore, semi-structured interviews were conducted with school administrators to obtain in-depth qualitative insights regarding implementation processes, institutional support, and contextual challenges. With participants' consent, the interviews were audio-recorded to ensure accuracy during transcription and analysis.

Finally, post-test literacy assessments were administered after a defined period of digital platform use. The post-tests were used to measure changes in learners' early literacy skills and to determine the effectiveness of the digital learning platforms in supporting literacy development.

8. Data Analysis

Quantitative Data Analysis

Quantitative data from literacy assessments and questionnaires was analysed using descriptive statistics such as frequencies, percentages, means, and standard deviations. Pre-test and post-test scores were compared to determine changes in learners' literacy performance. Where appropriate, simple inferential statistics such as paired t-tests were used to assess the significance of observed differences.

Qualitative Data Analysis

Qualitative data from interviews and observations was analysed thematically. Data was transcribed, coded, and organised into themes related to implementation practices, challenges, and perceived effectiveness. The qualitative findings were used to complement and explain the quantitative results.

9. Validity and Reliability

Validity

Validity refers to the extent to which a research instrument measures what it is intended to measure. A study is considered valid if the results accurately reflect the concept being investigated. According to John W. Creswell (2014), validity in quantitative research refers to the degree to which evidence and theory support the interpretations of test scores or data for their intended purpose. Similarly, Earl Babbie (2010) explains that validity concerns whether an empirical measure adequately reflects the real meaning of the concept under consideration.

To ensure validity; Research instruments were reviewed by experts in education and literacy. The literacy assessment and questionnaire will be piloted in a non-participating school. Triangulation of data sources (learners, teachers, administrators) will be employed.

Reliability

Reliability refers to the consistency or stability of a research instrument. A reliable instrument produces similar results when used repeatedly under similar conditions. According to William M. K. Trochim (2006), reliability is concerned with the consistency of a measure—whether the results are repeatable.

Reliability was ensured through; Standardised administration procedures for the literacy assessment, Clear instructions and scoring guidelines, and Consistent data collection methods across schools

10. Ethical Considerations

The study adhered to established ethical standards in educational research to ensure the protection of all participants. Informed consent was obtained from teachers and school administrators prior to their participation, while parental consent and learner assent were sought for all child participants to ensure their voluntary involvement. Confidentiality and anonymity were maintained throughout the study by assigning codes to participants' responses rather than using their names. Participation in the study was entirely voluntary, and all participants were informed of their right to withdraw from the study at any stage without any negative consequences. Furthermore, all data collected was used strictly for academic purposes, and no personal information was disclosed outside the context of this research.

11. Chapter Summary

This chapter described the methodology used to evaluate the effectiveness of digital learning platforms in early literacy development in three selected primary schools namely; Kanyebele Primary School, David Seidenfield Primary School and Nkhunga Primary School of Kanjeza Zone in Katete District, Eastern Province, Zambia. It outlines the research design, study area, population, sampling procedures, data collection instruments, data analysis techniques, and ethical considerations. The next chapter presents and analyses the findings of the study.

IV. Data Presentation, Analysis and Discussion

1. Overview

This chapter presents analyses and discusses findings according to the study objectives: changes in literacy skills, stakeholder perceptions, and contextual factors influencing success. It's expanded quantitative and qualitative findings on the effectiveness of digital learning platforms in early literacy development among Grade 1 and Grade 2 learners in three selected primary schools in Katete District, Eastern Zambia. Findings

are organised according to learner outcomes, teachers' practices and perceptions, and implementation challenges.

2. Learners' Early Literacy Performance

Table 1: Mean Pre-test and Post-test Literacy Scores (Learners n=90)

Literacy Skill	Pre-test Mean	Post-test Mean	Mean Gain
Letter Recognition	5.8	8.4	2.6
Phonemic Awareness	5.2	8.0	2.8
Word Decoding	4.6	7.5	2.9
Oral Reading Fluency	4.1	6.8	2.7
Reading Comprehension	3.9	6.2	2.3

Results in Table 4.1 indicates that the highest gains were recorded in phonemic awareness and word decoding, confirming that digital learning platforms were most effective in strengthening foundational literacy skills.

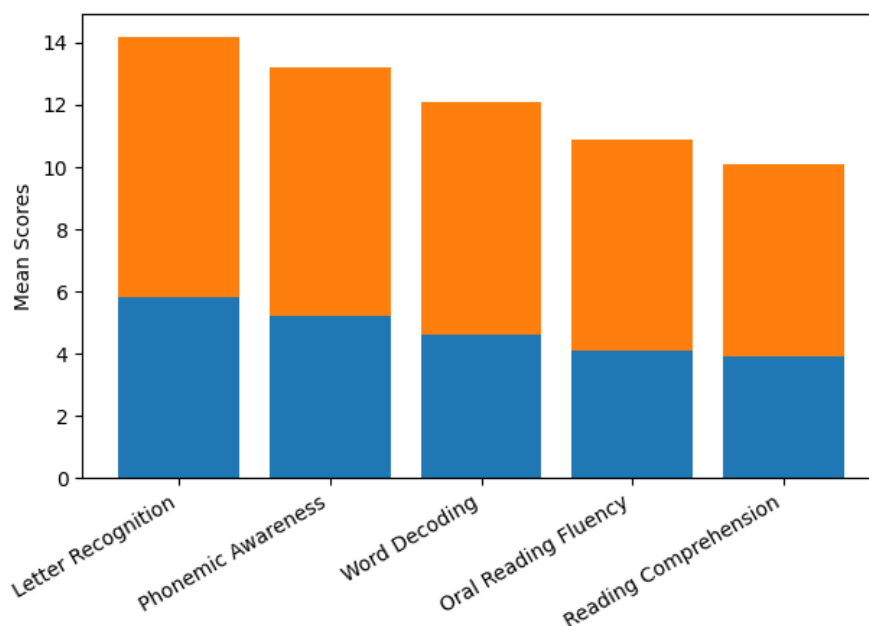


Figure 1: Pre-test and Post-test Literacy Scores

The results presented in Table 4.1 and Figure 4.1 indicates that learners recorded measurable improvements across all early literacy skills following exposure to digital learning platforms. Similar findings have been reported in previous studies which show

that digital and audio-supported learning tools enhance early literacy outcomes by providing interactive and repetitive learning experiences (UNESCO, 2021; World Bank, 2022).

The highest gains were observed in phonemic awareness and word decoding, which supports literature indicating that digital phonics-based programmes are particularly effective in strengthening foundational reading skills (Ehri, 2014; Abrami et al., 2018). Lower gains in reading comprehension suggest that comprehension skills develop more gradually and require sustained exposure and guided instruction.

The findings demonstrate that learners exposed to digital learning platforms showed consistent improvement across all assessed early literacy skills. This overall improvement suggests that digital learning platforms provided meaningful learning experiences that enhanced learners' acquisition of foundational literacy skills.

Phonemic Awareness and Letter Recognition

Substantial improvement was observed in phonemic awareness and letter recognition. Digital learning platforms provided consistent sound modelling and visual reinforcement, enabling learners to grasp letter–sound relationships more effectively.

Word Decoding Skills

Improvements in word decoding suggest that learners were able to apply phonemic awareness skills to blend sounds and recognise simple words. Repeated practice through digital platforms reinforced decoding processes.

Oral Reading Fluency

Learners demonstrated increased reading confidence, improved pronunciation, and reduced hesitation. Digital learning platforms created low-anxiety environments that encouraged repeated reading practice.

Reading Comprehension

Gains in reading comprehension were comparatively modest, reflecting the complexity of comprehension as a higher-order literacy skill that requires sustained teacher-led instruction.

2. Comparison of Literacy Gains by School

Table 2: Mean Literacy Gain by School (Learners n=90)

School	Mean Literacy Gain
Kanyelege Primary School	2.7
David Seidenfield Primary School	2.5
Nkhunga Primary School	2.9

According to Table 4.2, Nkhunga Primary School recorded the highest overall literacy gains, possibly due to more frequent use of digital learning platforms and better access to devices. (Field data, 2026)

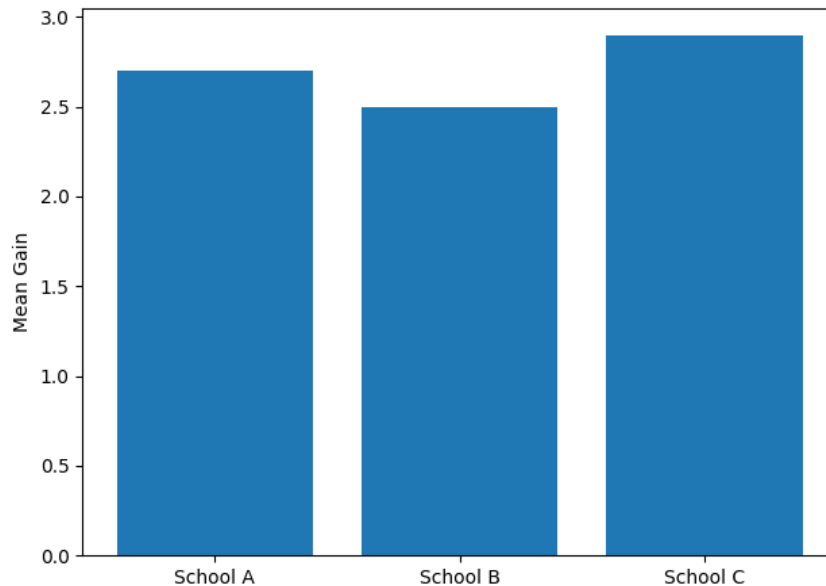


Figure 2: Mean Literacy Gains by School

School A = Kanyebele Primary School

School B = David Seidenfield Primary School

School C= Nkhunga Primary School

Findings from Table 4.2 and Figure 4.2 revealed variations in literacy gains across the three schools. Schools that demonstrated higher gains were those with more frequent use of digital learning platforms and better access to instructional resources. This finding aligns with research indicating that implementation fidelity and infrastructure availability significantly influences technology-enhanced learning outcomes (Kozma, 2011; Trucano, 2016).

3. Teachers' Use of Digital Learning Platforms

Table 3: Frequency of Digital Learning Platform Use

Frequency	Number of Teachers	Percentage (%)
Daily	3	33.3
2-3 times/week	4	44.4
Once/week	2	22.2
Rarely	0	0.0

Table 4.3 Shows that the majority of teachers used digital learning platforms at least two to three times per week, which contributed to consistent learner exposure and improved literacy outcomes.

The frequency of use reported in Table 4.3 shows that most teachers integrated digital learning platforms into literacy instruction at least two to three times per week. Regular use of digital tools has been associated with improved learner engagement and skill acquisition, particularly in early literacy contexts (Schindler et al., 2017).

Teachers who consistently integrated digital learning platforms were able to reinforce phonics instruction and provide learners with immediate feedback, which is critical for early reading development (Hirsh-Pasek et al., 2015).

4. Challenges Affecting Implementation

Table 4: Reported Challenges in Using Digital Learning Platforms (Learners n=90)

Challenge	Frequency	Percentage (%)
Limited devices	7	77.8
Electricity outages	6	66.7
Limited training	5	55.6
Large class size	6	66.7

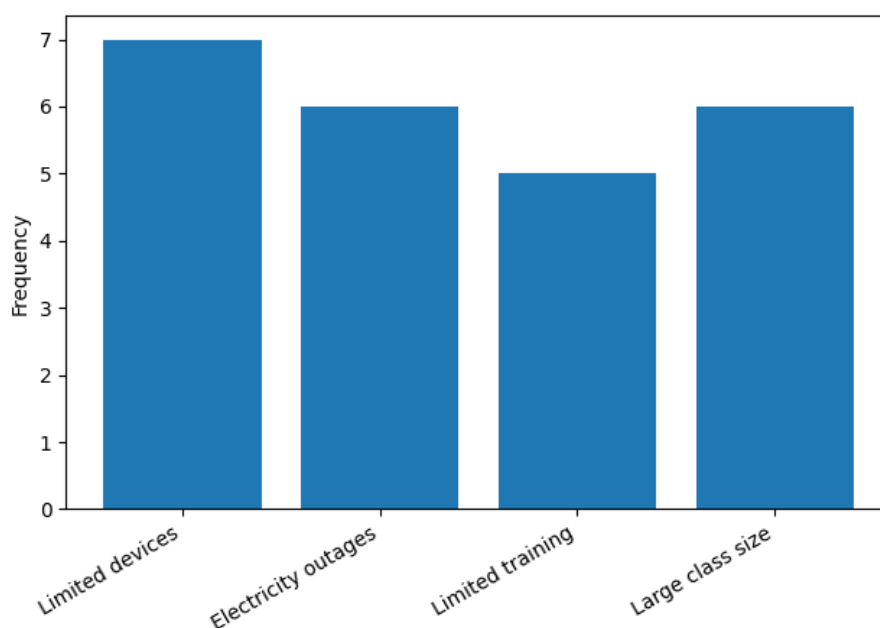


Figure 4.3: Challenges Affecting Use of Digital Learning Platforms

Figure 4.3 reveals that limited access to digital devices and electricity outages were the most commonly reported challenges, significantly constraining effective implementation.

The challenges identified in Table 4.4 and illustrated in Figure 4.3 indicate that limited access to digital devices, unreliable electricity supply, and large class sizes, and limited teacher training negatively affected the effective use of digital learning platforms. These challenges are consistent with findings from studies conducted in rural and low-resource settings (UNICEF, 2020; World Bank, 2021).

Such constraints reduce instructional time and limit opportunities for meaningful learner interaction with digital tools. This underscores the importance of adequate infrastructure investment and continuous teacher professional development.

5. Teachers' Perception of Usefulness

Table 5 Teachers' Perception of Usefulness (n=18)

Response Category	Frequency	Percentage (%)
Strongly Disagree	2	11.1
Disagree	1	5.6
Neutral	3	16.7
Agree	7	38.9
Strongly Agree	5	27.8

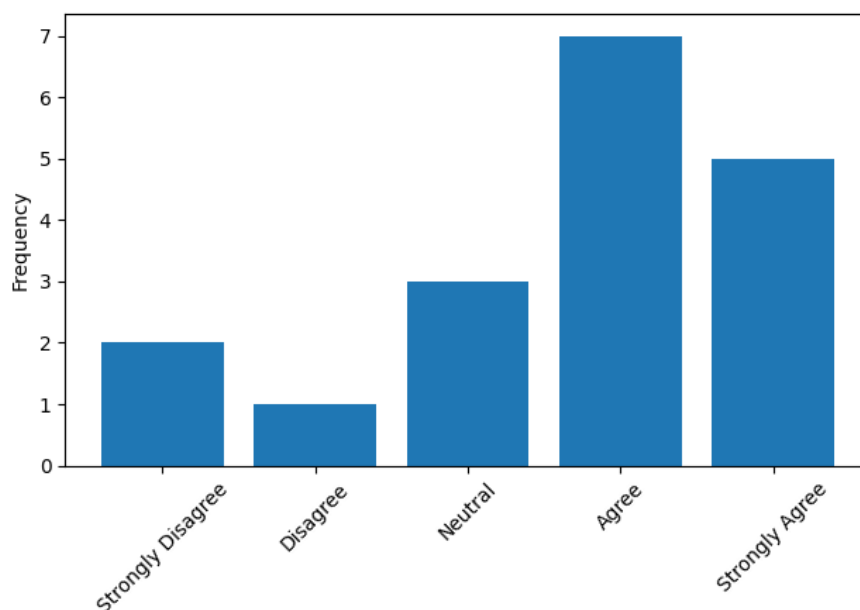


Figure 5 Teachers' Perception of Usefulness

Table 4.5 and Figure 4.5 indicate that 66.7% of teachers agreed or strongly agreed that digital learning platforms are useful in improving early literacy outcomes. This suggests high perceived usefulness among classroom teachers, which supports the Technology Acceptance Model that perceived usefulness influences adoption.

6. Teachers' Perception of Ease of Use

Table 6 Teachers' Perception of Ease of Use (n=18)

Response Category	Frequency	Percentage (%)
Strongly Disagree	3	16.7
Disagree	2	11.1
Neutral	4	22.2
Agree	6	33.3
Strongly Agree	3	16.7

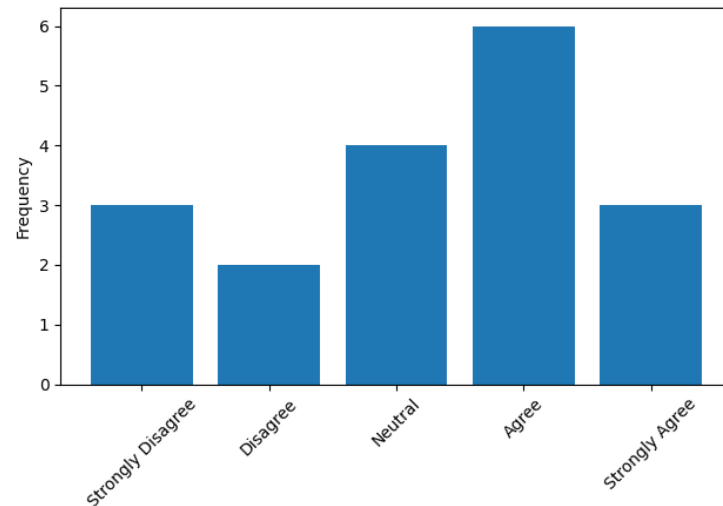


Figure 6: Teachers' Perception of Ease of Use

Table 4.6 and Figure 4.6 show that only 50% of teachers agreed that digital learning platforms are easy to use, while 27.8% expressed difficulty. This indicates moderate confidence but highlights a need for further training.

7. Teachers' Perception of Challenges

Table 7 Teachers' Perception of Challenges (n=18)

Response Category	Frequency	Percentage (%)
Strongly Disagree	1	5.6
Disagree	2	11.1
Neutral	3	16.7
Agree	7	38.9
Strongly Agree	5	27.8

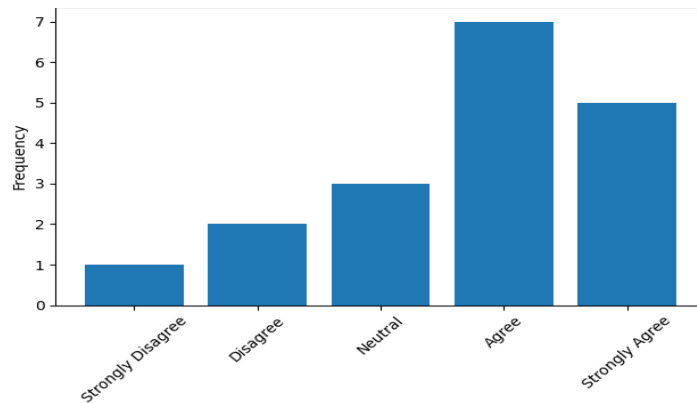


Figure 7: Teachers' Perception of Challenges

Table 4.7 and Figure 4.7 show that only 50% of teachers agreed that digital learning platforms are easy to use, while 27.8% expressed difficulty. This indicates moderate confidence but highlights a need for further training.

8. Head Teachers' Perception of Usefulness

Table 8 Head Teachers' Perception of Usefulness (n=3)

Response Category	Frequency	Percentage (%)
Strongly Disagree	0	0.0
Disagree	0	0.0
Neutral	0	0.0
Agree	2	66.7
Strongly Agree	1	33.3

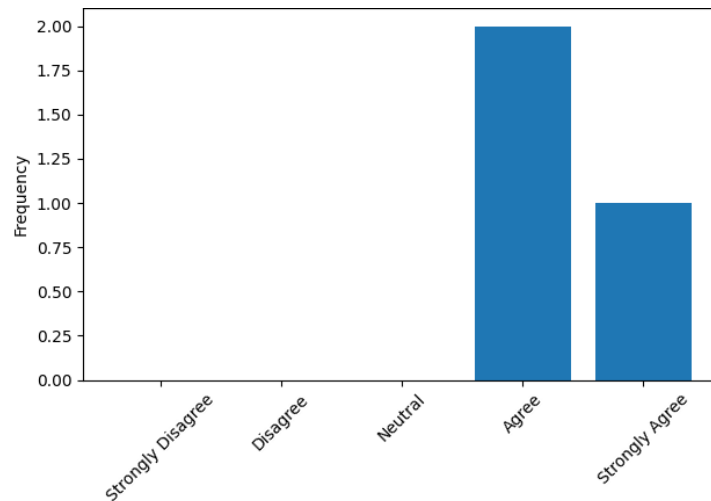


Figure 8: Head Teachers' Perception of Usefulness

Table 4.8 and Figure 4.8 demonstrate unanimous agreement among head teachers regarding the usefulness of digital learning platforms. This suggests strong administrative support at school leadership level.

9. Head Teachers' Perception of Ease of Use

Table 9 Head Teachers' Perception of Ease of Use (n=3)

Response Category	Frequency	Percentage (%)
Strongly Disagree	0	0.0
Disagree	1	33.3
Neutral	1	33.3
Agree	1	33.3
Strongly Agree	0	0.0

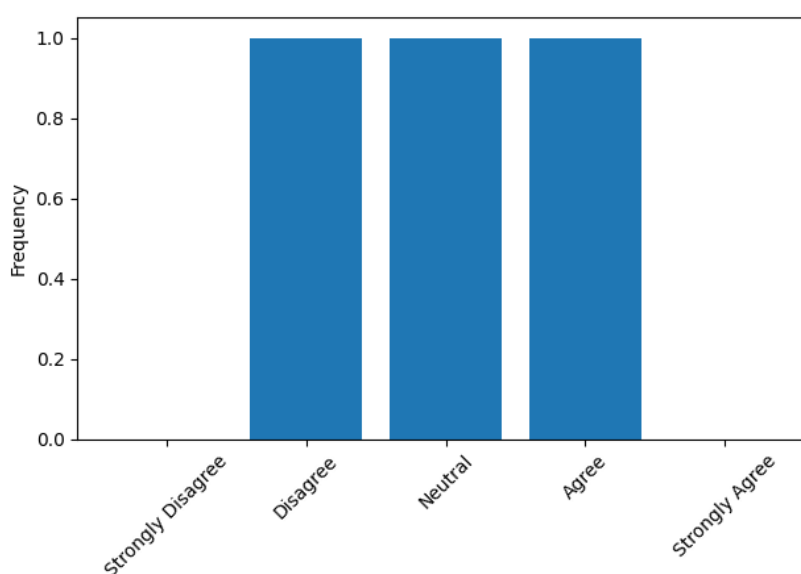


Figure 9: Head Teachers' Perception of Ease of Use

Table 4.9 and Figure 4.9 show mixed perceptions of ease of use among head teachers, indicating moderate digital management capacity.

10. Head Teachers' Perception of Challenges

Table 10 Head Teachers' Perception of Challenges (n=3)

Response Category	Frequency	Percentage (%)
Strongly Disagree	0	0.0
Disagree	1	33.3
Neutral	0	0.0
Agree	2	66.7
Strongly Agree	0	0.0

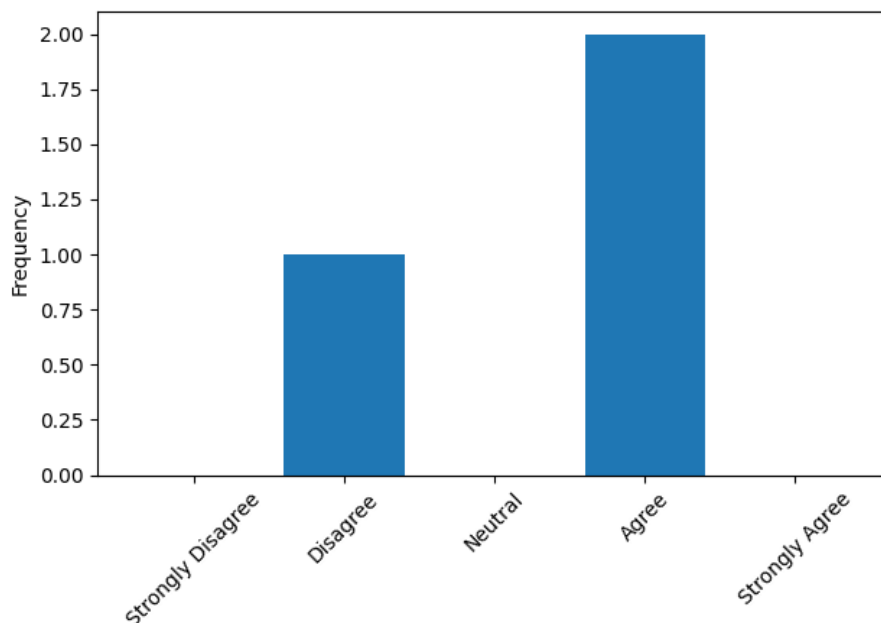


Figure 10: Head Teachers' Perception of Challenges

Table 4.10 and Figure 4.10 confirm that most head teachers acknowledge operational challenges, reinforcing teachers' responses and highlighting systemic issues affecting implementation in Katete District.

11. Classroom Observation Findings

Classroom observations revealed that digital learning platforms were most effective when used within a teacher-guided and structured learning environment. Learners demonstrated higher engagement levels when digital activities were aligned with lesson objectives. This supports socio-constructivist views that technology enhances learning when mediated by effective teaching practices (Vygotsky, 1978).

12. Teachers' Role in Digital Learning Effectiveness

Teachers played a central role in mediating the effectiveness of digital learning platforms. Regular use and active facilitation were associated with higher learner engagement and improved outcomes.

13. Implementation Challenges

Challenges such as limited devices, unreliable electricity, large class sizes, and limited training constrained effective use of digital learning platforms.

14. Implications for Early Literacy Instruction

The findings suggest that blended instructional approaches combining digital tools with explicit teacher instruction are most effective for early literacy development.

15. Summary of Chapter Four

In conclusion, this chapter presented, analyzed, and discussed the data collected on the effectiveness of digital learning platforms in supporting early literacy development in the selected primary schools in Katete District. The findings were systematically organized according to the study objectives and revealed important insights into how digital platforms are being utilized in early grade classrooms.

The results indicated that digital learning platforms have the potential to enhance early literacy skills, particularly in areas such as letter recognition, phonemic awareness, reading fluency, and learner engagement. Learners exposed to digital tools demonstrated increased motivation and participation compared to those in traditional learning environments. Additionally, the use of interactive content, audio-visual materials, and gamified learning activities was found to positively influence comprehension and retention among learners.

However, the findings also highlighted several challenges that limit the effectiveness of digital learning platforms. These include inadequate access to digital devices, unreliable internet connectivity, insufficient teacher training, and limited technical support. In some cases, teachers were not fully confident in integrating digital tools into literacy instruction, which affected the consistency and quality of implementation.

The discussion further revealed that while digital platforms offer significant opportunities for improving early literacy outcomes, their success largely depends on supportive infrastructure, teacher preparedness, and effective implementation strategies. Variations across the three selected schools suggest that contextual factors such as resource availability and administrative support play a critical role in determining the level of effectiveness.

Overall, the chapter demonstrates that digital learning platforms can be effective tools for enhancing early literacy development, but their impact is not uniform and is influenced by multiple interrelated factors. These findings provide a strong basis for the conclusions and recommendations presented in the subsequent chapter.

V. Summary, Conclusion and Recommendations

Overview

This chapter presents the conclusions drawn from the study and outlines recommendations that are directly aligned to the findings discussed in Chapters Four and Five. The recommendations are informed by learner performance data, teachers' practices, and identified implementation challenges. This study examined the effectiveness of digital learning platforms in enhancing early literacy development among Grade 1 and Grade 2 learners in three selected primary schools in Katete District, Eastern Zambia. The study was motivated by persistent challenges in early literacy achievement and the growing adoption of digital learning platforms as instructional tools within the Zambian education system. Using a mixed-methods case study design, the study generated both quantitative and qualitative evidence to assess learning outcomes and contextual factors influencing implementation.

Summary of the Study

The findings of the study demonstrate that digital learning platforms have the capacity to significantly enhance early literacy development, particularly at the foundational stages of reading acquisition. Learners who were exposed to digital learning platforms showed marked improvement in phonemic awareness, letter recognition, and word decoding. These improvements indicate that the interactive, audio-supported, and repetitive nature of digital learning platforms aligns well with the cognitive and developmental needs of early-grade learners.

In addition to foundational skills, the study observed positive changes in oral reading fluency, with learners displaying increased confidence, improved pronunciation, and reduced hesitation during reading tasks. However, improvements in reading comprehension were relatively modest, highlighting the complexity of comprehension as a higher-order literacy skill that requires sustained instructional support and extended engagement.

The study further established that the effectiveness of digital learning platforms was context-dependent. Differences in learner outcomes across the three schools revealed that consistent use of digital platforms, availability of digital devices, and teacher preparedness significantly influenced literacy gains. Schools that integrated digital learning platforms regularly and within structured lesson plans achieved better outcomes.

A key conclusion drawn from the study is the central role of teachers in mediating the effectiveness of digital learning platforms. Digital tools were most impactful when used within teacher-guided instruction, where teachers actively facilitated learning and linked digital activities to curriculum objectives.

The study also highlights significant systemic and infrastructural challenges that affect the successful integration of digital learning platforms in rural primary schools.

Limited access to digital devices, unreliable electricity supply, and large class sizes, and insufficient teacher training constrained optimal use.

Overall, the study concludes that digital learning platforms represent a valuable instructional resource for improving early literacy development in rural primary schools when implemented under supportive conditions. When integrated thoughtfully into classroom instruction, supported by trained teachers, and reinforced through adequate infrastructure, digital learning platforms can contribute meaningfully to improving literacy outcomes.

Implications of the Study

The findings imply that early literacy instruction should adopt blended learning approaches that combine digital learning platforms with explicit teacher instruction. Emphasis should be placed on using digital tools to reinforce phonics while teachers focus on comprehension and language development.

In final analysis, this study contributes important context-specific empirical evidence on the use of digital learning platforms in early literacy development within a rural Zambian setting. The findings provide practical insights for educators, policymakers, and development partners seeking to strengthen early literacy outcomes through technology-enhanced learning.

Recommendations

Recommendations for Schools and School Management

Primary schools should integrate digital learning platforms into the core early literacy programme rather than treating them as supplementary tools. Timetabled digital literacy sessions should be included in weekly teaching schedules to ensure consistent learner exposure. School administrators should regularly monitor the use of digital learning platforms through instructional supervision to ensure alignment with literacy objectives. Schools should establish systems for the maintenance, storage, and responsible use of digital devices to promote sustainability. Peer support structures such as professional learning communities should be encouraged to allow teachers to share best practices.

Recommendations for Teachers

Teachers should integrate digital learning platforms within blended learning approaches, combining digital activities with explicit instruction and guided practice. Digital platforms should be prioritised for phonics instruction, letter–sound correspondence, and word decoding, where the highest learning gains were observed. Teachers should supervise learners closely during digital sessions to ensure meaningful engagement. Continuous professional development in digital pedagogy should be prioritised.

Recommendations for the Ministry of Education and Policymakers

The Ministry of Education should invest in digital infrastructure, particularly in rural schools, including provision of devices and reliable electricity supply. Teacher education and in-service training programmes should incorporate digital pedagogy for early literacy. Clear national guidelines should be developed to support integration of digital learning platforms within the Competency-Based Curriculum. Monitoring and evaluation frameworks should be strengthened to assess the impact of digital learning initiatives.

Recommendations for Cooperating Partners and NGOs

Development partners should adopt holistic implementation approaches that combine device provision, teacher training, infrastructure support, and monitoring. Digital learning interventions should be designed with sensitivity to local school contexts. Collaboration with education authorities should be strengthened to ensure sustainability.

Recommendations for Parents and the Community

Parents and community members should be sensitised on the importance of digital learning platforms in early literacy development. Where possible, parents should support learners' reading practice and responsible use of digital devices at home.

Contribution to Knowledge

This study contributes empirical evidence on the effectiveness of digital learning platforms in early literacy development within a rural Zambian context and highlights conditions necessary for successful implementation.

Limitations Revisited

The case study design and short intervention period limit generalisability. Variations in infrastructure and teacher competence may also have influenced outcomes.

Recommendations for Further Research

Future studies should conduct longitudinal research to examine long-term impacts of digital learning platforms on literacy development. Comparative and platform-specific studies are recommended to enhance generalisability and identify effective design features.

4. Final Conclusion

In conclusion, this study set out to evaluate the effectiveness of digital learning platforms in enhancing early literacy development among learners in three selected primary schools in Katete District, Eastern Zambia. The findings of the study have demonstrated that digital learning platforms, when appropriately implemented, can play a significant role in improving foundational literacy skills such as reading, phonemic awareness, vocabulary development, and learner engagement.

The study established that learners who were exposed to digital learning tools showed notable improvements in participation, motivation, and comprehension compared to those relying solely on traditional teaching methods. The interactive and multimedia nature of digital platforms was found to support diverse learning styles and make literacy instruction more engaging and learner-centered.

However, the study also revealed that the effectiveness of digital learning platforms is highly dependent on several critical factors. These include the availability of adequate digital infrastructure, access to devices, reliable internet connectivity, and the level of teacher competence in integrating technology into instruction. Challenges such as limited resources, insufficient teacher training, and technical constraints were identified as key barriers that hinder the full realization of the benefits of digital learning platforms.

Overall, the study concludes that while digital learning platforms have considerable potential to enhance early literacy development in primary schools, their effectiveness is not automatic and requires deliberate planning, investment, and support. For digital learning to have a sustainable and meaningful impact there must be coordinated efforts among government, schools, and other stakeholders to address infrastructural and capacity-related challenges.

Therefore, the successful integration of digital learning platforms in early literacy education in Katete District and similar contexts will depend on strengthening institutional support systems, enhancing teacher training, improving access to technological resources, and ensuring continuous monitoring and evaluation. When these conditions are met, digital learning platforms can serve as powerful tools for improving literacy outcomes and contributing to the broader goal of quality education for all learners.

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