

From Tablets to Tests: Advancing Accessible Education for Visually Impaired Learners at Likoni School, Kenya

Pamella Karambu Muriungi¹

¹Machakos University, School of Education

ABSTRACT

Learners who are blind or have low vision face persistent challenges in accessing inclusive learning opportunities, including limited availability of assistive technologies, reliance on print-based materials, and gaps in teacher training. Inclusive education remains a global priority, yet structural barriers continue to restrict equitable educational access. In Kenya, these challenges make innovative interventions essential for improving learning outcomes and participation. Likoni Primary School for the Blind in Mombasa County provides a leading example of inclusive digital education. The school implemented a completely digital learning environment, equipping students from Grade 1 through junior school with Chromebooks to foster autonomous learning and develop digital skills. This initiative is part of inABLE's mission to enhance learning opportunities for students who are blind or have low vision through computer-assisted technology and accessible digital content. The school has also hosted visits that showcased how technology can enhance educational experiences for visually impaired learners. This study used an exploratory qualitative case study design, incorporating field observations, interviews with teachers and administrators, and school records analysis to examine the outcomes of the initiative. Findings indicate significant gains in students' scholastic achievement, confidence, independence, and overall development. Professional development for teachers strengthened instructional approaches, while active community engagement supported inclusive practices beyond the classroom. Overall, the experience of Likoni School illustrates a scalable model for promoting inclusive and accessible education in resource-limited contexts. These insights provide guidance for educational leaders, policymakers, and practitioners seeking to implement technology-driven solutions that expand learning opportunities for students with visual impairments in Kenya and similar settings worldwide.

KEYWORDS

low vision, inclusive learning, assistive technology, digital learning, autonomous learning

INTRODUCTION

Globally, millions of children live with visual impairment, with the majority in low- and middle-income countries where access to quality education is limited (WHO, 2021). In Kenya, visually impaired learners often face challenges such as a lack of braille textbooks, limited assistive technologies, and few teachers trained in special education (Ministry of Education, 2022). These barriers can lead to late school enrollment, overage students, and lower academic achievement, limiting both educational and social opportunities for these learners. Likoni School for the Visually Impaired, established in 2016 in Mombasa County, stands out as a model for inclusive education in the coastal region. The school provides boarding facilities, a dedicated teaching team, and a fully digital learning environment, with Chromebooks and assistive technologies that support independent learning and early digital literacy. Through these innovations, the school aims to ensure that visually impaired learners have access to the same opportunities as their peers, while preparing them for national examinations and future academic success. This study examines how the combination of technology, specialized teacher training, and community support contributes to improving learning outcomes for students at Likoni School. Understanding these strategies is important because it offers insights into practical ways to overcome barriers faced by visually impaired learners. It also provides lessons for educators, policymakers, and other schools seeking to implement inclusive and technology-driven approaches in resource-limited contexts. By exploring both academic outcomes and holistic development, this study highlights the value of creating equitable learning environments that can be

adapted and scaled to benefit learners across Kenya and similar settings worldwide.

LITERATURE REVIEW

INCLUSIVE EDUCATION AND THE SOCIAL MODEL OF DISABILITY

The Social Model of Disability frames disability not as an inherent limitation within the individual but as a consequence of environmental, social, and attitudinal barriers (Oliver, 1990). This perspective shifts the focus from what the person "cannot do" to what society can do to remove obstacles and enable full participation. Within the context of education, this means that barriers such as inaccessible learning materials, rigid teaching methods, and exclusionary policies—not the visual impairment itself—often prevent students from achieving their full potential. Inclusive education, therefore, is not only about physically integrating learners into mainstream classrooms; it is about ensuring meaningful engagement, equal opportunities, and autonomy in learning.

For students with visual impairments, meaningful inclusion requires a combination of accessible instructional materials, adaptive teaching strategies, assistive technologies, and supportive institutional structures. This may include braille textbooks, screen readers, voice-to-text software, tactile learning devices, and teacher expertise in inclusive pedagogies. Beyond access to tools, social and environmental factors—such as teacher attitudes, peer support, and community engagement—also influence whether students can fully participate in learning activities. By addressing these systemic barriers, the Social Model emphasizes the responsibility of educational institutions and society at

large to create environments that enable all learners to thrive academically, socially, and emotionally.

Likoni School for the Visually Impaired exemplifies this approach in practice. By integrating assistive technologies, structured digital literacy programs, and ongoing teacher training, the school transforms the learning environment to remove barriers and empower students. The combination of environmental modifications, human support, and technology integration ensures that learners not only attend school but actively engage with content, collaborate with peers, and develop skills necessary for academic success and future employment. This demonstrates how applying the Social Model in educational settings can move beyond theoretical frameworks to practical, scalable solutions for inclusive education.

Assistive technology plays a critical role in bridging the gap between learners with visual impairments and meaningful access to the curriculum. For students who are blind or have low vision, conventional print-based and visually intensive learning environments often create significant barriers to participation. Technologies such as screen readers, braille displays, voice-to-text software, and tactile learning devices help to remove these barriers by enabling learners to access, process, and produce information independently. Research has consistently shown that when appropriately implemented, assistive technologies enhance learner autonomy, academic engagement, and overall achievement (Alper & Raharinirina, 2006).

Globally, studies indicate that visually impaired learners rely heavily on assistive technologies to navigate digital and e-learning environments. Research conducted in India, the United States, and South Africa demonstrates that screen-reading software such as JAWS and NVDA, along with accessible digital platforms, are essential for equitable participation in online learning (Sharma & Gupta, 2017; Ravichandran, Sujathamali, & Gunasekaran, 2022; Dabi & Golga, 2023). However, even in developed contexts where e-learning platforms are widely available, accessibility remains uneven. Many systems are designed primarily for sighted users and rely on complex visual layouts that limit usability for students with visual impairments unless compatible assistive technologies are in place (Permvattana, Armstrong, & Murray, 2013; Mahfuz et al., 2021).

In developing contexts, challenges are often compounded by outdated ICT infrastructure, limited institutional support, and insufficient training for educators. Studies from Namibia, Zimbabwe, Ethiopia, and South Africa report that students with visual impairments experience exclusion due to inaccessible platforms, incompatible software, and limited availability of modern assistive technologies (Kasaira & Bwalya, 2020; Pitsoane & Matjila, 2021; Zenda et al., 2024). These findings highlight that the mere presence of technology does not guarantee inclusion; rather, technology must be intentionally designed, supported, and aligned with inclusive pedagogical practices.

ASSISTIVE TECHNOLOGY

At Likoni School for the Visually Impaired, assistive technology is embedded into daily teaching and learning processes. Learners routinely use screen readers and voice-to-text software to access Google Classroom,

complete assessments through Google Forms, and produce written work using Google Docs. This structured integration allows students to engage independently with academic content, including formal examinations. Beyond supporting curriculum access, the consistent use of assistive technology fosters digital fluency, confidence, and self-reliance, demonstrating a practical and contextually grounded application of the Social Model of Disability.

Early digital literacy has increasingly been recognized as a critical foundation for academic success, particularly for learners with visual impairments. Digital literacy extends beyond basic device use to include the ability to locate information, evaluate its credibility, communicate responsibly, and create content using digital tools. For visually impaired learners, early exposure to accessible digital technologies can significantly reduce learning gaps that often emerge when instruction relies heavily on print-based materials. Introducing digital skills at an early age allows learners to develop confidence and familiarity with assistive technologies before academic demands intensify.

Research suggests that preschool and early primary learners benefit substantially from structured digital literacy programs that incorporate tablets, adaptive software, and guided technology use. Gentry et al. (2018) found that early engagement with digital tools supports cognitive development, enhances problem-solving skills, and promotes independence among young learners. Similarly, studies focusing on visually impaired students indicate that early mastery of keyboard skills, screen readers, and navigation commands strengthens literacy and numeracy development while reducing later dependence on support personnel (Wati & Sulisty, 2020).

Evidence from Indonesia further demonstrates that students with visual impairments are active and capable users of digital media when provided with appropriate support. Learners in special schools were found to engage extensively with smartphones and computers using screen readers, not only for academic purposes but also for communication and content creation. Notably, some students demonstrated advanced digital literacy by producing creative content such as instructional tutorials shared on online platforms, reflecting both technical competence and responsible digital citizenship (Wati & Sulisty, 2020). These findings challenge deficit-based assumptions about visually impaired learners and underscore the importance of early, intentional digital exposure.

EARLY DIGITAL LITERACY

At Likoni School for the Visually Impaired, early digital literacy is systematically developed from pre-primary levels through junior secondary school. Younger learners begin with foundational keyboarding and navigation skills, while older students progressively advance to online research, digital communication, classroom management platforms, and basic coding. This structured progression ensures continuity in skill development and prepares learners to engage confidently with digital assessments and national examinations. By embedding digital literacy early in the learning journey, the school creates a pathway through which learners with visual impairments can achieve academic competence,

digital fluency, and readiness for higher education and employment.

Despite national and global commitments to inclusive education, learners with visual impairments in Kenya continue to face significant structural and systemic barriers. Access to quality education is often constrained by shortages of trained teachers, limited availability of assistive technologies, inadequate infrastructure, and persistent social stigma. Many schools lack braille textbooks, adaptive learning materials, and digital devices that are compatible with screen-reading software, limiting learners' ability to engage independently with the curriculum. As a result, visually impaired learners frequently experience delayed school enrollment, interrupted learning trajectories, and reduced academic achievement.

Teacher preparedness remains a critical challenge within the Kenyan context. While inclusive education policies exist, many educators have limited training in special needs education and assistive technology integration. This gap affects the effective use of available resources and often results in instructional practices that unintentionally exclude visually impaired learners. Without adequate professional development, teachers may struggle to adapt digital platforms, assessments, and classroom activities to meet diverse learning needs, particularly in technology-mediated learning environments.

Socio-cultural factors further compound these challenges. Limited parental awareness of inclusive education practices and assistive technologies can reduce support for learners both at home and in school. In some communities, visual impairment continues to be associated with stigma, which may discourage early school enrollment or sustained participation. Research emphasizes that inclusive education requires the active involvement of multiple stakeholders—including families, educators, policymakers, and community organizations—to address both material and attitudinal barriers (UNESCO, 2021).

Within this context, schools that successfully integrate assistive technology and inclusive pedagogies remain relatively few. The case of Likoni School for the Visually Impaired highlights how targeted investment in digital tools, continuous teacher training, and community partnerships can mitigate many of these challenges. By providing accessible learning environments and structured digital literacy pathways, the school offers a practical response to systemic constraints facing visually impaired learners in Kenya. Examining such models is therefore essential for informing policy and practice aimed at strengthening inclusive, technology-driven education across the country.

CONCLUSION

The reviewed literature demonstrates that inclusive education for learners with visual impairments is most effective when grounded in the Social Model of Disability and supported by intentional environmental and systemic interventions. Globally, assistive technology has been shown to play a central role in enabling access to curriculum content, particularly within increasingly digital learning environments. However, evidence from both developed and developing contexts reveals that the availability of e-learning platforms alone does not

guarantee inclusion; accessibility, compatibility with assistive technologies, and institutional support are equally critical. Early digital literacy emerges as a key factor in promoting independence, confidence, and long-term academic success among visually impaired learners, particularly when introduced through structured and developmentally appropriate programs.

Within the Kenyan context, persistent challenges—such as limited teacher training, inadequate resources, and socio-cultural barriers—continue to constrain meaningful inclusion for visually impaired learners. While policy frameworks promote inclusive education, practical implementation remains uneven, and examples of successful, technology-driven models are relatively limited. The literature therefore points to a gap in context-specific studies that document how assistive technology, early digital literacy, and teacher capacity-building can be effectively integrated at the school level. This study addresses this gap by examining the practices at Likoni School for the Visually Impaired, offering empirical insights into how inclusive, technology-enhanced learning environments can support academic engagement, digital fluency, and examination preparedness for visually impaired learners in Kenya.

RESEARCH QUESTIONS

- How does the use of assistive technology at Likoni School support independent learning and engagement among visually impaired students?
- In what ways does specialized teacher training enhance the integration of digital tools in inclusive classrooms?
- How do early digital literacy programs impact students' academic performance, confidence, and progression in digital skills?
- What challenges do visually impaired learners face in accessing digital education, and how are these challenges addressed through school initiatives and community engagement?

METHODS

STUDY DESIGN

This study adopted a qualitative case study design, supported by descriptive quantitative data, to examine how assistive technology and digital literacy are integrated at Likoni School for the Visually Impaired. The qualitative approach allowed for an in-depth exploration of teaching practices, learner engagement, and institutional experiences related to inclusive digital education. Descriptive quantitative data drawn from school records were used to provide contextual information on learner enrollment, participation in digital learning activities, and examination engagement. A case study design was appropriate as it enabled a detailed examination of a single institution within its real-life educational context.

STUDY CONTEXT

Likoni School for the Visually Impaired is located in Mombasa County and serves learners with visual impairments from pre-primary through junior secondary levels. At the time of the study, the school enrolled 160 learners and was staffed by 26 teachers and 13 auxiliary staff. The school provides boarding facilities, specialized

instruction, and technology-enhanced learning environments, including assistive technology labs that support digital learning across grade levels.

PARTICIPANTS AND SAMPLING

Participants were selected using purposive sampling, focusing on individuals directly involved in the implementation and use of assistive technology and digital learning practices. The study involved three categories of participants:

Learners: Visually impaired learners across different grade levels who were observed during classroom instruction, digital lessons, and assessment activities.

Teachers: Twelve (12) teachers drawn from the 26 teaching staff, selected based on their direct involvement in classroom instruction, digital teaching, and the use of assistive technologies.

Administrators: Five (5) school administrators responsible for curriculum implementation, assessment coordination, and digital infrastructure support.

This sampling strategy ensured that participants possessed relevant experience and knowledge related to the study objectives.

DATA COLLECTION METHODS

Data were collected using multiple methods to enhance depth and credibility through triangulation. This included:

Classroom Observations: Non-intrusive observations were conducted across different grade levels to document classroom interactions, learner engagement, and the use of assistive technologies and digital platforms such as Google Classroom and Google Forms.

Interviews: Semi-structured interviews were conducted with teachers and administrators to explore pedagogical practices, implementation experiences, challenges encountered, and perceived outcomes of integrating assistive technology in teaching and assessment.

Document and Records Review: School records were reviewed to obtain descriptive quantitative data, including learner enrollment figures, participation in digital assessments, examination records, and documented academic progression.

DATA ANALYSIS

Qualitative data from interviews and observations were analyzed thematically. Data were first organized and reviewed to identify recurring patterns related to access, learner independence, teacher practices, and institutional support. These patterns were then grouped into themes aligned with the study objectives and research questions. Descriptive quantitative data from school records were used to complement and contextualize the qualitative findings rather than for inferential statistical analysis.

ETHICAL CONSIDERATIONS

Permission to conduct the study was obtained from the school administration. Participation was voluntary, and informed consent was obtained from all interview participants. The anonymity and confidentiality of learners and staff were maintained through the use of non-identifiable data. Classroom observations were conducted

respectfully and without disruption to routine teaching and learning activities.

RESULTS

ACCESS AND INDEPENDENT USE OF ASSISTIVE TECHNOLOGY

Observations at Likoni School revealed that learners engage confidently with assistive technologies in their daily lessons. Across all grade levels, students demonstrated proficiency in using screen readers, voice-to-text software, and digital platforms such as Google Classroom, Google Forms, and Google Docs. Even younger learners in pre-primary classes displayed foundational keyboard skills and basic navigation abilities, while older students were observed completing online assessments independently.

Teachers reported that consistent access to these tools had significantly increased learner autonomy. One teacher explained:

“Students now navigate the platforms on their own, submit assignments, and even help each other when they encounter challenges. They are much more independent than before we started using these technologies.”

These findings indicate that structured exposure to assistive technology allows learners not only to participate in lessons but also to gain confidence and digital fluency.

TEACHER PRACTICES AND DIGITAL INTEGRATION

Teachers at Likoni School have developed innovative practices to integrate digital tools into their pedagogy. Observations and interviews showed that teachers use a combination of Google Classroom, interactive assessments, and adaptive software to deliver lessons that are accessible to all learners. For example, one teacher described how she conducts reading comprehension exercises:

“I create the worksheets in Google Docs, and students use screen readers or voice typing to complete them. I can then track their progress in real time.”

Administrators highlighted that continuous professional development and peer mentoring among teachers had been crucial in sustaining these practices. This structured approach ensures that assistive technologies are embedded into daily teaching rather than being used sporadically.

EARLY DIGITAL LITERACY AND LEARNER PROGRESSION

The development of digital literacy was observed to be both progressive and structured. Younger learners focused on foundational skills, such as keyboard use, typing, and navigating digital documents. As learners advanced through the grades, they gained proficiency in research, communication, Google Forms assessments, and basic coding.

Students also demonstrated peer-to-peer support, with advanced learners assisting others in navigating technology. One administrator noted:

“Some of our older students now teach their peers how to use new features or solve problems on the devices. This not only reinforces their own skills but also builds a culture of collaboration.”

These observations suggest that early and continuous digital literacy development enhances both independent learning and cooperative skill-building.

HOLISTIC DEVELOPMENT AND ACHIEVEMENTS

Beyond academic skills, learners at Likoni School actively develop social, creative, and life skills. Participation in sports, arts, and boarding activities contributes significantly to their overall development. For instance:

Sports: Learners won the 2023 Coast Region football championship at the Special Needs Games, demonstrating teamwork, resilience, and competitive skills.

Arts: Students have received national recognition in music and drama, including performances at the State House, highlighting creativity and confidence.

Life Skills: The boarding environment fosters independence, social competence, and self-management. A teacher noted:

“Our learners not only become confident on the computer but also in handling daily life tasks on their own. The boarding program helps them build independence and responsibility.”

These achievements indicate that technology integration is complemented by broader institutional efforts that promote holistic learner development.

CHALLENGES AND COPING STRATEGIES

Despite the successes, some challenges were observed. Occasional device malfunctions, limited access to some software, and the need for ongoing teacher support were noted. Teachers addressed these challenges through peer mentoring, adaptive lesson planning, and collaboration with inABLE staff. One teacher commented:

“When devices fail or students struggle, we adapt quickly. The focus is on ensuring that no learner is left behind.”

These findings illustrate that while technology enhances learning, supportive structures and problem-solving strategies remain essential to maintain inclusion and engagement.

SUMMARY

Overall, the results show that Likoni School's integration of assistive technology, structured digital literacy, and supportive teaching practices enables visually impaired learners to engage independently, develop digital fluency, and achieve both academic and holistic outcomes. The combination of classroom observations, teacher interviews, and school records demonstrates that technology, when embedded systematically, can transform the learning experiences of visually impaired students.

DISCUSSION

This study highlights how the integration of assistive technology, teacher practices, and early digital literacy at Likoni School for the Visually Impaired contributes to meaningful inclusion and holistic learner development. Observations and interviews revealed that learners across

all grade levels engage confidently with digital tools, including screen readers, voice-to-text software, and platforms such as Google Classroom, Google Forms, and Google Docs. Even younger learners in pre-primary classes displayed foundational keyboard skills and basic navigation abilities, while older students progressed to advanced competencies, including online assessments and basic coding. One teacher reflected, *“Students now navigate the platforms on their own, submit assignments, and even help each other when they encounter challenges.”* These findings echo global research emphasizing that assistive technologies enhance learner independence and academic achievement for visually impaired students (Alper & Raharirina, 2006; Sharma & Gupta, 2017; Ravichandran, Sujathamali, & Gunasekaran, 2022).

The study also underscores the critical role of teachers in mediating technology use and fostering digital inclusion. Continuous professional development, innovative pedagogy, and peer mentoring enabled teachers to embed technology into daily lessons effectively. This approach aligns with UNESCO (2021) and Pitsoane and Matjila (2021), who note that teacher preparedness is central to successful inclusive education. Through the deliberate integration of digital platforms, learners can participate fully in curriculum activities, engage with assessments independently, and gain confidence in their abilities.

Early digital literacy emerged as another key factor in supporting learner progression. Structured exposure to technology allowed younger students to develop foundational skills, while older learners consolidated advanced digital competencies. Peer-to-peer mentoring further reinforced learning, creating a collaborative culture in which students teach and support one another. These findings support research demonstrating that early engagement with digital tools fosters cognitive development, literacy, and problem-solving skills for visually impaired learners (Gentry et al., 2018; Wati & Sulisty, 2020).

Beyond academic outcomes, the study shows that learners' holistic development is enhanced through participation in sports, arts, and life skills programs. Students won the 2023 Coast Region football championship at the Special Needs Games, achieved national recognition in music and drama, and developed independence and social competence through the boarding environment. As one teacher noted, *“Our learners not only become confident on the computer but also in handling daily life tasks on their own. The boarding program helps them build independence and responsibility.”* These observations illustrate that inclusive, technology-enhanced education can foster well-rounded learners prepared for higher education and employability.

Despite these successes, challenges persist. Occasional device malfunctions, limited software availability, and the need for ongoing teacher support were observed. Teachers and administrators addressed these issues through adaptive lesson planning, peer

mentoring, and collaboration with inABLE staff. This reflects findings in other contexts, where technology alone is insufficient without institutional support and professional capacity building (Permvattana, Armstrong, & Murray, 2013; Mahfuz et al., 2021).

Overall, the study demonstrates that when assistive technologies are embedded systematically within teaching practices, supported by trained teachers, and reinforced through early digital literacy programs, visually impaired learners can achieve meaningful inclusion and thrive academically and socially. The success of Likoni School serves as a model for inclusive, technology-driven education, providing practical insights for policymakers, educators, and institutions seeking to remove barriers and create equitable learning opportunities for students with visual impairments.

CONCLUSION

The findings of this study offer several practical insights for inclusive education in Kenya and similar contexts. The integration of assistive technologies within daily teaching and assessment practices demonstrates that learners with visual impairments can achieve independence, digital fluency, and meaningful engagement when environmental barriers are removed. Schools and policymakers should therefore prioritize investment in accessible digital tools, teacher training, and ongoing professional development to support such initiatives.

The study also highlights the importance of a structured, scaffolded approach to early digital literacy. Introducing learners to foundational digital skills in pre-primary, and progressively developing advanced competencies in higher grades, strengthens academic outcomes while equipping learners with essential life-long skills for higher education and employability. Beyond academics, the holistic development of learners through participation in sports, arts, and boarding programs reinforces social competence, creativity, teamwork, and independence. These results emphasize that inclusive education must address the full spectrum of learner development, not just classroom achievement.

Collaboration among teachers, administrators, technology providers, and community partners emerged as another key factor in sustaining inclusion. Such multi-stakeholder engagement ensures that learners are supported consistently, and that the integration of technology is effective and meaningful.

However, the study is not without limitations. Focusing on a single school limits the generalizability of the findings to other contexts. The reliance on observations and interviews introduces potential subjectivity in interpreting learner engagement and teaching practices. Additionally, the study provides a snapshot in time, and longer-term tracking would yield a more comprehensive understanding of the sustained impact of assistive technology. Lastly, while descriptive quantitative data were included, the study was primarily qualitative, limiting statistical generalizations. Despite these constraints, the study offers rich, contextualized insights into how inclusive digital education can be implemented successfully.

LIMITATIONS OF THE STUDY

While the study offers valuable insights, several limitations should be acknowledged. First, the research focused on a single case study, which limits the generalizability of the findings to other schools or regions. Second, the study relied heavily on observations and interviews, which may introduce subjectivity in interpreting learner engagement and teacher practices. Third, the study captured a snapshot in time, and longer-term tracking of learner progress and outcomes would provide a more comprehensive understanding of the impact of assistive technology. Finally, while some descriptive quantitative data were included from school records, the study was primarily qualitative; thus, the findings cannot provide statistical evidence of broader trends. Despite these limitations, the study offers a rich, contextualized understanding of how inclusive digital education can be implemented effectively for visually impaired learners.

CONCLUSION

This study illustrates that inclusive, technology-enhanced education can transform the learning experiences of visually impaired learners. Likoni School for the Visually Impaired serves as a model of how assistive technologies, teacher practices, early digital literacy, and holistic support can work together to promote academic achievement, independence, and social development. Learners not only demonstrate proficiency in digital tools but also thrive in extracurricular activities and life skills, reinforcing that meaningful inclusion extends beyond the classroom. These findings provide practical guidance for educators, policymakers, and institutions seeking to advance inclusive education in Kenya and similar contexts. Teachers, and providing continuous support to ensure equitable learning opportunities. Overall, the study contributes practical insights for educators, policymakers, and institutions seeking to advance inclusive education in Kenya and similar contexts.

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