EFFECT OF INTEGRATING ASSISTIVE TECHNOLOGIES ON ACADEMIC PERFORMANCE FOR LEARNERS WITH VISUAL IMPAIRMENT IN SELECTED INTEGRATED SECONDARY SCHOOLS IN SOUTH RIFT COUNTIES, KENYA.

ABIGAEL JEPCHUMBA

A THESIS SUBMITTED TO THE SCHOOL OF EDUCATION, DEPARTMENT OF EDUCATIONAL MANAGEMENT AND POLICY STUDIESIN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THEAWARD OF THE DEGREE OF MASTER OF EDUCATION IN RESEARCH

MOI UNIVERSITY

NOVEMBER, 2025

DECLARATION

Declaration by Candidate

I hereby declare that this research thesis is my original work and has never been submitted to any learning institution for academic consideration.

Sign: _____ Date: 17/09/2025

ABIGAIL JEPCHUMBA MS/R/5051/23

Thesis Title: *"Effect of Integrating Assistive Technologies on Academic Performance for Learners with Visual Impairment in Selected Integrated Secondary Schools in South Rift Counties, Kenya".*

Declaration by the Supervisors

This thesis has been submitted for examination with our approval as the supervisors.

Sign: _____ Date: 18/09/2025

Dr. Njeri Kiaritha (Ph.D.)

Department of Educational Psychology,

School of Education

Moi University, Eldoret

Kenya.

Sign: _____ Date: 18/19/2025

Dr. Janeth Mlay (Ph.D.)

Department of Physical Education and Sport Sciences,

School of Education

University of Dar-es Salaam,

Tanzania.

DEDICATION

This work is dedicated to all learners with and without Special Needs in Education in Kenya.

ACKNOWLEDGEMENT

First, I would like to express thanks to the Almighty God for his love, strength, courage, peace of mind and good health throughout the journey of undertaking this study.

Second, I thank my supervisors Dr. Njeri Kiaritha and Dr. Janeth Mlay for the continuous support, guidance, patience, motivation and immense knowledge which enabled me to write this thesis.

Special thanks also go to DAAD through the CERM-ESA program for the scholarship. I appreciate the financial support throughout my studies. I also thank the CERM-ESA project leaders and coordinators from all the five universities for their support. Special thanks to Prof. Susan Kurgat for her support and co-ordination at Moi University CERM-ESA Centre which enabled the smooth running of events during the thesis progress.

I thank my loving Parents, Henry and Divina together with my husband, Elphas for their prayers and support in my study.

Lastly, I would like to thank my friends and classmates; Eric, Mishi, Usman, Jean and Mabior for their motivation and assistance during the thesis development. Special thanks go to Mr. Kenneth Muthomi for his unwavering support. I remain forever grateful. I say THANK YOU and may the Almighty God bless you all.

ABSTRACT

The 2018 Special Needs Education Policy Framework in Kenya aimed to improve academic performance for learners with visual impairment (LVI) through inclusive education. Despite the potential of Assistive Technologies (AT), many LVI in secondary schools continue to perform below their peers. This study examined the effect of integrating assistive technologies on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya. The study objectives were to assess the status of assistive technologies available; to determine the types of AT instructional support provided; to investigate the level of learner involvement in using AT; and to examine the influence of AT integration on academic performance. Guided by the Social Model of Disability and the Constructivist Learning Theory, the study explored both the structural barriers to AT use and the ways learners construct knowledge through interaction and AT-supported engagement. A mixed-methods approach was adopted using a convergent parallel research design within a pragmatic paradigm. The target population comprises 55 LVI, 10 special needs teachers and 3 principals from selected integrated secondary in South Rift counties, Kenya. The study involved 48 LVI selected through stratified random sampling, and 5 special needs education teachers and 3 principals selected through purposive sampling. Data were collected using questionnaires, interviews, observation checklists, and document analysis. Quantitative data were analyzed using percentages, means, standard deviation, and regression analysis, while qualitative data were analyzed thematically. The findings showed that available ATs included Braille machines, Perkins Braillers, and geometric sets, while digital ATs such as screen readers, Braille Note Takers, and magnifiers were either limited or outdated. Qualitative data from teacher and principal interviews revealed that this lack of modern tools discouraged learner motivation and narrowed opportunities for independent study. Instructional support was available but inconsistently applied across subjects ($M = 3.237$, $SD = 0.786$), with teachers citing inadequate training and lack of resources. Engagement levels were generally high, with 86.9% of learners regularly taking part in AT-supported lessons and 89.5% engaging in peer collaboration during these sessions. However, classroom observations confirmed that some learners remained disadvantaged due to unequal access to devices and limited instructional guidance. Teachers further reported that outdated AT not only discouraged learner motivation but also forced some students to rely on peers when devices were unavailable. Regression analysis showed a positive relationship between AT integration and academic performance ($R^2 = 0.489$; $\beta = 0.699$, $p < 0.05$). The study concluded that inadequate integration of assistive technologies, coupled with inconsistent instructional support and uneven learner involvement, significantly affected the academic performance of LVI. The study therefore recommends targeted investment in up-to-date digital ATs, with priority given to subjects where access gaps were greatest. Regular, subject-specific professional development to strengthen teachers' ability to integrate AT into instruction. Finally, peer mentoring programs supported by structured teacher guidance were proposed to improve learner participation and ensure equitable access to AT. The results of this study inform inclusive education policy and practice; teachers and school leaders can apply the findings to strengthen the use of assistive technologies in classrooms, while learners with visual impairment gain pathways to improved academic participation and achievement.

ABRREVIATIONS AND ACRONYMS

ATs	Assistive Technologies
CCTV	Closed Circuit Television
GPS	Global Positioning System
JAWS	Job Access with Speech
KISE	Kenya Institute of Special Education and
LVI	Learners with Visual Impairment
NACOSTI	National Commission for Science, Technology and Innovation.
NCPWD	National Council for People with Disability
NVDA	Non-Visual Desktop Access
OAE	Opto-Acoustic Emissions
OCR	Optical Character Recognition
SEN	Special Educational Needs.
SNE	Special Needs Education
TSC	Teachers Service Commission
UDHR	Universal Declaration of Human Rights
UN	United Nations
WHO	World Health Organization

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Introduction

This chapter focuses on the background, the statement of the problem, the purpose, objectives, the research questions, research hypothesis, justification, significance, scope, limitations and the assumptions of the study. It further discusses the underpinning theoretical and conceptual frameworks of the study and the operational definition of terms.

1.1 Background to the Study

Education is widely recognized as a fundamental human right and a driver of individual and societal development. Globally, there has been a growing commitment to ensuring equitable access to quality education for all learners, including those with disabilities. For learners with visual impairment (LVI), assistive technologies (ATs) have emerged as essential tools that facilitate access to learning content, enable participation in educational activities, and support academic achievement.

Globally, research has demonstrated the potential of assistive technologies in improving educational outcomes for learners with visual impairment. In the United States, a survey involving 165 teachers of visually impaired students revealed that 57.5% of them lacked the confidence to teach or explain the use of ATs (Finetti & Luongo, 2023). This reflects a broader challenge: while ATs are known to enhance learning, gaps persist in teacher preparedness and institutional support.

Similarly, Dhaygude and Waghmare (2019) conducted a study in Karachi, Pakistan, involving learners at secondary level, which showed a positive impact of AT use on academic

performance. However, the study also reported a shortage of AT devices in institutions and emphasized the need for more comprehensive support structures to ensure effective implementation. These findings underscore a global issue: while the benefits of ATs are well-documented, their integration into educational systems remains inconsistent.

In developed nations, legal frameworks often play a significant role in facilitating inclusive education. For instance, the Americans with Disabilities Act defines disability as a condition that limits major life activities, reinforcing the right to accommodations and assistive tools (Murithi et al., 2022). Tools such as screen readers, Braille displays, and text-to-speech software help bridge the gap in learning access for visually impaired students, particularly when integrated with inclusive teaching practices and trained staff.

Efforts to support learners with disabilities have also included visual impairment training, adapted assessments, and curriculum modifications. For example, Groenewegen (2016) found that early adoption of visual impairment contributed to better reading and comprehension outcomes. Conversely, Zhou and Griffin-Shirley (2021) noted that a lack of inclusive schools and limited exposure to bilingual teaching methods contributed to the underperformance of visually impaired learners in Hong Kong. These global studies collectively reveal a consistent narrative: assistive technologies hold promise in addressing educational disparities for LVI, but systemic challenges, ranging from resource limitations to policy gaps and training deficits, continue to hinder their widespread, effective use.

Within the African context, the right to education for learners with disabilities is increasingly embedded in national policies and legal frameworks. Most countries have adopted inclusive education policies aligned with global commitments such as the Salamanca Statement and

the UN Convention on the Rights of Persons with Disabilities (Simalalo, 2021). Nevertheless, the implementation of these frameworks often faces practical barriers.

Thurlow et al. (2017) reported that in Zambia, learners with visual impairment often struggle due to an unfriendly curriculum, limited communication technologies, and inadequate teacher training. These challenges are not unique to Zambia but are mirrored across several African countries. The report also highlighted the absence of assessment policies tailored for learners with disabilities and emphasized the need for alternative formats that incorporate assistive technologies.

A study by Su et al. (2020) drew parallels between developed and developing countries, observing that learners in both contexts face common challenges related to infrastructure, policy enforcement, and educator training. However, the severity of these challenges tends to be more pronounced in low-income regions where funding and technical support are minimal. Despite these hurdles, learners with visual impairment in Africa have shown potential for academic success when provided with supportive environments. This supports the argument that underperformance among LVI is often not due to the disability itself, but rather to systemic shortcomings that fail to provide equitable learning conditions.

Kenya has made significant strides toward inclusive education. The 2010 Constitution affirms the rights of persons with disabilities to access educational institutions and facilities (Republic of Kenya, 2010). Policies such as Vision 2030, the Free Secondary Education initiative, and commitments to the Millennium Development Goals have reinforced the country's dedication to providing quality education for all, including learners with special needs.

Despite this strong legal framework, learners with visual impairment in Kenya continue to face educational disparities. A study by Lazarus and Mbithe (2018) in Makueni County found that assistive technologies positively influenced cognitive development and academic performance for learners with disabilities. However, challenges such as limited funding, negative attitudes from staff, and lack of clear policy guidelines hindered the widespread implementation of ATs.

Chege et al. (2019) further highlighted these issues in their study of special schools across Kenya. They found that low-technology ATs (e.g., Braille slates and tactile rulers) were more readily available compared to mid- and high-level technologies (e.g., Braille embossers, screen readers), indicating resource constraints and possible gaps in technological capacity. Importantly, their study pointed out that many special schools still operate under resource-poor conditions, limiting the full potential of AT use in supporting learners' academic performance.

Integrated education is a key pillar of inclusive education in Kenya, particularly in the South Rift Counties. Integrated secondary schools in this area enroll both sighted learners and those with visual impairments in the same classrooms, making the need for equitable instructional tools even more pressing. However, the South Rift Counties presents unique contextual challenges. These include geographical disparities, varying infrastructure development, and socio-economic constraints that affect the implementation and sustainability of assistive technologies. In rural and semi-urban areas, limited access to electricity, internet connectivity, and trained personnel further complicate AT integration in learning environments (Republic of Kenya, 2018).

While international and local research has highlighted the value of assistive technologies for learners with visual impairment, there remains a gap in understanding their practical effect on academic performance in integrated secondary schools, particularly in underserved regions like Kenya's South Rift. Most existing studies have focused on special schools or urban settings, leaving integrated rural or semi-urban schools under-researched (Chege et al., 2019; Lazarus & Mbithe, 2018; Murithi et al., 2022).

Despite strong legal frameworks and documented potential of AT on learners' academic performance, there is little rigorous evidence on whether and how assistive technologies are effectively integrated into teaching, learning, and evaluation in integrated secondary schools within Kenya's South Rift Counties. Without understanding these dynamics, LVI learners continue to suffer inequitable academic outcomes. This study sought to investigate the extent and quality of AT integration in selected integrated secondary schools and determine its effect on academic performance among learners with visual impairment.

1.2 Statement of the Problem

Achieving inclusive and equitable quality education for all, as envisioned in United Nations Sustainable Development Goal 4 and Kenya's Vision 2030, requires that every learner, regardless of disability, has the opportunity to reach their full academic potential. This means that, learners with visual impairments (LVI) should have equitable access to quality education, supported by inclusive policies, adequately trained personnel, and relevant technologies that enable them to compete on equal footing with their sighted peers.

However, despite policy and infrastructural efforts to support learners with visual impairments, their academic performance remains significantly lower than that of their sighted peers (de Verdier, 2016; Shahed et al., 2016). In Kenya, only 7,000 of an estimated

45,000 school-age visually impaired learners are enrolled in school (KSB, 2021), and many of them underperform due to challenges such as lack of instructional support, insufficient access to assistive technologies, and inadequate teacher training (Anyango & Okello, 2023; Guanoluisa et al., 2022). Studies consistently show that limited access to screen readers, Braille resources, and inclusive curricula continues to impede academic achievement for these learners.

Although assistive technologies (ATs) have been identified as promising tools to address these disparities, their integration into rural classrooms remains limited and under-researched. Particularly in the integrated secondary schools in South Rift Counties, the effectiveness of ATs on academic outcomes has not been adequately evaluated. This study therefore seeks to fill that gap by investigating how the integration of assistive technologies influences the academic performance of learners with visual impairments in such settings.

1.3 Purpose of the Study

The purpose of this study was to determine the effect of integrating Assistive Technologies on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya.

1.4 Study Objectives

i. To assess status of Assistive Technologies used to enhance academic performance for learners with visual impairment in in selected integrated secondary schools in South Rift Counties, Kenya.

ii. To determine the types of Assistive Technology Instructional Supports used to enhance academic performance for learners with visual impairment in in selected integrated secondary schools in South Rift Counties, Kenya.

iii. To investigate the level of learner involvement in the use of Assistive Technologies to enhance academic performance for learners with visual impairment in in selected integrated secondary schools in South Rift Counties, Kenya.

iv. To examine the influence of integration of Assistive Technologies on academic performance for learners with visual impairment.

1.5 Research Hypothesis

The following Null hypothesis was tested at α=0.05 level of significance:

i. Hypothesis ($\mathbf{H_{01}}$): Status of Assistive Technologies have no statistically significant influence on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya.

ii. Hypothesis ($\mathbf{H_{02}}$): Assistive Technologies instructional supports have no statistically significant influence on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya.

iii. Hypothesis ($\mathbf{H_{03}}$): Levels of learner involvement in the use of Assistive Technologies have no statistically significant influence on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya.

iv. Hypothesis (H04): Integration of Assistive Technologies have no statistically significant influence on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya.

1.6 Justification of the Study

Kenya's commitment to inclusive education is enshrined in its Vision 2030 and aligned with the United Nations Sustainable Development Goal 4, which advocates for inclusive,

equitable, and quality education for all. To actualize this vision, it is essential that learners with disabilities, including those with visual impairments (LVI), are provided with equal opportunities to achieve academic success. Central to this effort is the integration of assistive technologies (ATs), which play a critical role in enabling LVI to access, process, and engage with academic content effectively.

While national education policies, such as the Persons with Disabilities Act (2003) and the Special Needs Education Policy Framework (2018), acknowledge the rights of learners with disabilities, implementation gaps persist. Despite infrastructure and curriculum reforms, visually impaired learners in inclusive schools continue to experience lower academic performance than their sighted peers (de Verdier, 2016; Shahed et al., 2016). Barriers such as inadequate assistive devices, limited teacher training, and insufficient inclusive instructional strategies remain significant impediments (Anyango & Okello, 2023; Guanoluisa et al., 2022). These challenges are further pronounced in rural areas, where resource constraints are more acute.

Consequently, there is an urgent need to explore the practical integration and effectiveness of assistive technologies in real-world learning environments. This study focused on selected inclusive secondary schools in the South Rift Counties, Kenya rural institutions that admit both visually impaired and sighted learners. These schools provide a valuable context for examining how assistive technologies influence academic performance among LVI in settings where resources and support systems may be unevenly distributed. Despite the growing emphasis on inclusive education, limited empirical research has evaluated how well ATs are working in such schools and whether they are helping to narrow the performance gap.

Therefore, this study addresses a critical knowledge gap by investigating the role of assistive technologies in improving academic outcomes for visually impaired learners in selected rural schools. By focusing on schools in the South Rift Counties, the study captures how policy, infrastructure, and day-to-day classroom practice intersect to affect educational equity. The findings will offer practical evidence to guide policymakers, school leaders, and educators in enhancing the implementation of assistive technologies and strengthening inclusive education across similar contexts, ultimately advancing Kenya's goals for equitable and quality education for all.

1.7 Significance of the Study

This study assessed the effect of integrating assistive technologies (ATs) on the academic performance of learners with visual impairments in selected schools in the South Rift Counties. The findings are relevant to a range of education stakeholders, including learners with visual impairments, special needs educators, inclusive secondary schools, the Ministry of Education, and development partners. The study carries both theoretical and practical value, especially in strengthening inclusive education efforts in Kenya and similar contexts.

Learners with visual impairments stand to benefit directly from the study by gaining insights into how effective use of assistive technologies can improve academic performance and classroom engagement. By identifying which technologies and strategies have the most impact, the study promotes more equitable learning experiences and empowers learners to participate more fully in academic life. Improved access to ATs can enhance their independence, build confidence, and support better academic outcomes.

Special needs educators will also benefit from the study, particularly regarding the most effective AT tools and teaching approaches for visually impaired learners. The findings can

inform teacher training and professional development by highlighting current gaps and suggesting ways to strengthen inclusive instructional practices. This will help educators tailor their lessons, engage all learners more effectively, and improve academic results across diverse classrooms.

At the institutional level, inclusive secondary schools in the South Rift Counties will gain practical guidance on how to integrate assistive technologies within their existing systems. The results can support school leaders in developing inclusive policies, investing in appropriate AT infrastructure, and designing learning environments that accommodate both visually impaired and sighted learners. The study also contributes to informed decision-making on resource allocation, curriculum adaptation, and inclusive classroom planning.

For national stakeholders such as the Ministry of Education, curriculum developers, and related agencies, the study provides valuable data to support policy development aimed at improving inclusive education. It offers evidence on how assistive technologies influence academic outcomes, which can inform future strategies, funding decisions, and teacher deployment plans. Additionally, the findings may help guide the inclusive implementation of the Competency-Based Curriculum (CBC), ensuring it better serves learners with disabilities. Development partners, NGOs, and donors can also use this evidence to align their support more closely with the real needs on the ground and promote greater equity in access to quality education.

1.8 Scope of the Study

Geographically, the study was confined to selected schools in the South Rift Counties of Kenya. These public secondary schools were strategically chosen because they enroll learners with visual impairments and are situated in rural settings, making them appropriate

for examining how assistive technologies (ATs) are integrated in environments that often face infrastructural and educational challenges. Focusing on multiple schools allowed for a broader contextual analysis while still maintaining attention to the unique characteristics of rural inclusive education.

Content-wise, the study focused on examining how the integration of assistive technologies affects the academic performance of learners with visual impairment. The dependent variable was the academic performance of these learners. Independent variables included the types of assistive technologies used (e.g., screen readers, Braille embossers, audio books), the nature of instruction provided (e.g., individualized training, peer-assisted use), the extent of learner involvement (e.g., frequency of use, autonomy in operation), and how well ATs were integrated into regular teaching and assessments. The study also considered several extraneous variables that could influence outcomes, such as teacher attitudes toward ATs, training levels of special needs education (SNE) teachers, learners' cognitive abilities, age, and environmental conditions like electricity availability and network access. These factors were analyzed in line with the study's conceptual framework to clarify their role in the relationship between AT integration and academic outcomes.

Methodologically, the study used a mixed-methods approach, applying a concurrent triangulation research design. This allowed for the collection of both qualitative and quantitative data at the same time, enabling cross-validation and deeper understanding of the findings. Data collection tools included structured questionnaires for learners with visual impairments to quantify AT use and academic outcomes, interview schedules for special needs teachers and school administrators to gather in-depth insights, and observation checklists to assess actual classroom use of assistive technologies. This combination of

instruments helped the study capture both measurable trends and real-life classroom dynamics.

Population-wise, the study targeted learners with visual impairment, special needs education teachers, and school administrators across the selected schools. A sample was drawn using both purposive and random sampling methods. Learners were randomly selected across school levels to ensure diversity in age and experience with ATs, while teachers and administrators were purposively included based on their roles in supporting and implementing AT use. This sampling strategy ensured that the voices of both users and implementers were represented in the study.

Theoretically, the study was guided by the Social Model of Disability and the Constructivist Learning Theory. The Social Model provided a framework for analyzing external barriers, such as limited resources or teacher attitudes, that affect the effectiveness of assistive technologies. Meanwhile, the Constructivist Learning Theory supported the examination of how learners actively engage with ATs to build knowledge, promoting autonomy and meaningful academic participation. These two frameworks together helped connect systemic constraints with learner-centered teaching practices.

In terms of time scope, the study was conducted between May 2023 and January 2024. This period included all research phases, from designing tools and collecting data to analyzing findings and writing the final report. Importantly, it coincided with a full academic cycle, ensuring that the results captured typical patterns of assistive technology use and learner performance throughout the school year.

1.9 Limitations of the Study

Several factors limit the generalizability of the findings from this study on the effect of

integrating assistive technologies on academic performance for learners with visual impairment in selected schools in the South Rift Counties of Kenya. However, specific measures were taken to mitigate these limitations:

The study was conducted in a limited number of schools within the South Rift Counties, which may affect the extent to which the findings can be generalized to other regions or countries where educational practices, resources, and policies may differ (Flaxman et al., 2017). To strengthen the broader relevance of the findings, a comprehensive literature review was conducted to compare and contrast similar studies from various contexts.

Data collection occurred within a relatively short timeframe, which may not reflect the long-term impact of assistive technologies on academic performance (Hopwood et al., 2022). To address this, both qualitative and quantitative methods were used to provide a more complete understanding of the short-term effects.

The study focused exclusively on learners with visual impairments, which may limit the applicability of the results to learners with other types of disabilities or to students without disabilities (Phutane et al., 2022). Nonetheless, the findings offer valuable insights into strategies for improving academic performance within inclusive education settings.

The study relied in part on self-reported data from teachers and learners, which may introduce bias, including social desirability or subjective interpretation. To improve reliability, triangulation was used, combining self-reports from questionnaires and interviews with classroom observations.

1.10 Assumptions of the study

In conducting this study, several key assumptions were made to minimize the influence of extraneous variables and maintain focus on the integration of assistive technologies in education:

It is assumed that both teachers and learners generally hold positive attitudes toward assistive technologies. This assumption is based on the understanding that participants have been exposed to such technologies as part of their educational environment. However, no direct measurement of attitude was undertaken prior to the study.

The study also assumes that variations in teacher training do not significantly affect the outcomes. Although teachers may have been trained at different institutions, it is assumed that the standardization of the teacher education curriculum by the Commission for University Education (CUE) and the Ministry of Education (MOE) has minimized significant disparities in pedagogical approaches to assistive technology.

Furthermore, it is assumed that learners possess relatively similar academic preparedness, given that the selected schools in the South Rift Counties are secondary institutions that admit students through competitive academic processes. This assumption helps to reduce the influence of disparities in cognitive ability on the study's findings.

It is also assumed that all participants, both teachers and learners, were willing and cooperative in providing accurate and truthful responses. This assumption supports the reliability and validity of the data collected.

The age range of learners is assumed to fall within the typical spectrum for secondary school students. This helps to minimize the influence of developmental or age-related factors on learning outcomes.

Lastly, it is assumed that the physical and environmental conditions in the selected schools within the South Rift Counties are generally stable and conducive to learning. This assumption allows the study to isolate the effects of assistive technology on academic outcomes without interference from external environmental variables.

1.11 Theoretical Framework

The study was guided by the Social Model of Disability and the Constructivist Learning Theory.

1.11.1 Social Model of Disability

The Social Model of Disability, pioneered by Michael Oliver in 1990, emerged as a radical departure from the traditional medical model that perceived disability primarily as a personal deficit or pathology. Rooted in the activism of the British disability rights movement, the model situates disability within the societal and environmental constraints that inhibit full participation by individuals with impairments. According to Oliver (1990), it is not the impairment itself that disables individuals but rather the socially constructed barriers; whether attitudinal, institutional, or infrastructural, that restrict their inclusion. The key tenets of this model include the conceptualization of disability as a product of exclusionary practices, the emphasis on structural reform over individual remediation, and the assertion of the rights of disabled persons to participate equally in society (Barnes & Mercer, 2010; Shakespeare, 2006).

Underlying this model are several assumptions: first, that society plays a central role in constructing disability through inaccessibility and discrimination; second, that equality can only be achieved through the removal of these societal barriers; and third, that disabled people are best positioned to articulate their needs and lead the transformation process. However, the model has not been without criticism. Scholars such as Shakespeare (2006) argue that while the Social Model of Disability has been instrumental in advocacy, it tends to neglect the lived realities of impairment, including pain, functional limitations, and the need for medical support. Furthermore, some critics contend that the model inadequately addresses

intersectionality, such as how gender, class, and cultural context intersect with disability (Ghai, 2002). Similarly, Cobley (2012) pointed out that, although inclusive strategies that were firmly based on social model principles tended to be among the most successful, exclusive reliance on this ideology risks marginalizing a large section of the disability population.

Despite these criticisms, the Social Model has been widely applied in empirical research to analyze educational, health, and policy barriers affecting persons with disabilities. For instance, Hosking (2008) used the model to critique education systems that marginalize disabled learners through inaccessible pedagogy and curricula, while Lang (2009) applied it in sub-Saharan African contexts to examine how exclusion is reproduced in school systems. In the Kenyan education context, Mutua and Dimitrov (2001) noted that environmental and attitudinal barriers significantly hinder visually impaired learners' academic engagement, a finding echoed in recent studies emphasizing the need for inclusive technologies and infrastructure (Macmbinji, 2023).

The relevance of this model to the present study lies in its capacity to shift the analytical lens from the individual learner to the structures that either enable or inhibit their academic success. This shift is critical in assessing Statusof Assistive Technologies and examining how the integration of these technologies influences academic performance. By viewing academic performance through the lens of systemic barriers and opportunities, the Social Model helps identify the broader institutional dynamics that either support or constrain the learning environment of visually impaired learners.

1.11.2 Constructivist Learning Theory

Complementing the Social Model of Disability is the Constructivist Learning Theory, which

emphasizes the active role of learners in constructing knowledge through interaction with their environment. Rooted in the works of John Dewey (1933, 1986) and Jean Piaget (1972), this theory asserts that learning is not a passive transmission of information but rather a dynamic process shaped by exploration, reflection, and experience. Dewey's emphasis on experiential education and democratic learning environments intersects with Piaget's cognitive constructivism, which posits that learners build mental models by assimilating and accommodating new information within existing cognitive schemas.

The central tenets of constructivism include learner-centered instruction, active engagement, scaffolding, and the contextualization of knowledge within real-world settings (Fosnot, 2013). For learners with visual impairments, constructivist pedagogy implies the provision of meaningful opportunities for exploration and engagement through sensory-rich, adaptive learning environments. This is where assistive technologies become crucial. Tools such as Braille displays, screen readers, tactile graphics, and audio feedback mechanisms serve not merely as compensatory aids but as enablers of independent inquiry, cognitive development, and reflective thinking (Abner & Lahm, 2002).

Constructivist theory rests on the assumption that all learners, regardless of ability, can achieve meaningful learning when given the right tools and opportunities to interact with their environment. It also assumes that learning is inherently social and collaborative, drawing upon Vygotsky's and Cole (1978) notion of the Zone of Proximal Development (ZPD), which highlights the importance of guided learning through social interaction. Critics, however, argue that constructivism can be overly idealistic and vague in practical application, particularly in contexts where resources are limited or teachers are insufficiently trained (Tobias & Duffy, 2009). Moreover, some scholars warn that too much emphasis on learner

autonomy may inadvertently disadvantage those who require more structured support, such as learners with complex disabilities (Mayer, 2004).

Nonetheless, empirical studies have demonstrated the efficacy of constructivist approaches in inclusive education. Al-Azawei et al. (2017), for instance, found that learner-centered, technology-enhanced instruction significantly improved engagement and learning outcomes among students with disabilities in higher education. Similarly, Jarbi (2024) documented how screen-reading technologies facilitated deeper learning and autonomy among visually impaired university students in Qatar. In the Kenyan context, Njeru et al. (2024) emphasized the importance of learner-centered teaching and adaptive instructional tools in improving the academic achievement of learners with special needs.

The adoption of Constructivist Learning Theory in this study is thus both pedagogically and practically significant. It not only affirms the cognitive potential of learners with visual impairments but also informs the design of instructional environments that empower them to actively participate in and contribute to their own learning processes. This directly informs the study by examining instructional strategies for AT use and evaluating learner involvement in these processes. By highlighting the role of assistive technologies as integral and not supplementary to pedagogy, constructivism challenges conventional didactic models and advocates for a transformative rethinking of educational delivery. When applied to this study, the constructivism theory provides a foundation for evaluating the extent to which classroom practices are responsive to the learning needs of visually impaired learners and whether the learning environment fosters or inhibits their intellectual agency.

Using both the Social Model of Disability and Constructivist Learning Theory as the orientating lens provides a robust and multidimensional theoretical foundation for this study.

The Social Model of Disability allows for a critical examination of the societal and institutional barriers that may hinder the successful implementation and accessibility of ATs, thereby directly informing the investigation into status of ATs and how these technologies influence academic outcomes. Constructivist Learning Theory, on the other hand, offers pedagogical insight into how instructional methods and learner engagement with ATs can enhance performance, thus directly supporting the analysis of AT instructions and learner involvement. Their integration allows for a rigorous investigation of how availability of assistive technologies and their integration in the classroom instructional practices converge to shape the educational experiences and influence academic performance of learners with visual impairments.

1.12 Conceptual Framework

A conceptual framework is a visual representation of the relationship between the variables of the study. Figure 1.3 illustrates the interaction between the independent variables (status of assistive technology, assistive technology instruction, level of learner involvement in the use of assistive technologies, and integration of assistive technologies), the dependent variable (academic performance for learners with visual impairment), and the extraneous variables (teachers' attitudes with the use of assistive technologies, level and quality of training of SNE teachers, intelligence levels of learners [IQ], age of learners, and environmental factors).

In this study, academic performance for learners with visual impairment, which is the dependent variable (DV), is measured through end-of-year exam scores. This variable represents the key outcome the study seeks to influence through the use of assistive technologies.

The independent variables (IVs) in the study include status of assistive technology, which are classified into devices; such as Braille writers, hand-held magnifiers, talking calculators, and video magnifiers (CCTV) and software; such as Job Access with Speech (JAWS) and Non-Visual Desktop Access (NVDA). These technologies support learners by enabling Braille writing, magnification of printed materials, audible mathematical calculations, and screen reading functions.

Assistive technology instruction is another independent variable and includes instruction types such as video magnifier instruction, note taker instructions, accessing audio book instruction, and navigation without mouse instruction. Each of these supports learners through reading and viewing support, writing and note taking, literacy access, and computer navigation for independent use, respectively.

Additionally, the level of learner involvement in the use of assistive technologies; categorized as low, medium, or high, is considered as an independent variable. This reflects the degree to which learners actively engage with assistive technologies in their learning processes.

Integration of assistive technologies is also included as an independent variable and encompasses factors such as learner access and permission to use assistive technologies, active learner participation in AT-integrated lessons, collaboration with peers while using ATs, teacher customization of ATs to meet individual learning needs, opportunities for independent learner interaction with ATs, and motivation to learn and innovate through the use of ATs.

Lastly, extraneous variables include teachers' attitudes with the use of ATs, the level and quality of training of SNE teachers, intelligence levels of learners (IQ), age of learners, and environmental factors. These variables may influence the outcomes of the study but are

assumed to be controlled or consistent across participants to ensure that the effects of the independent variables on the dependent variable are accurately measured.

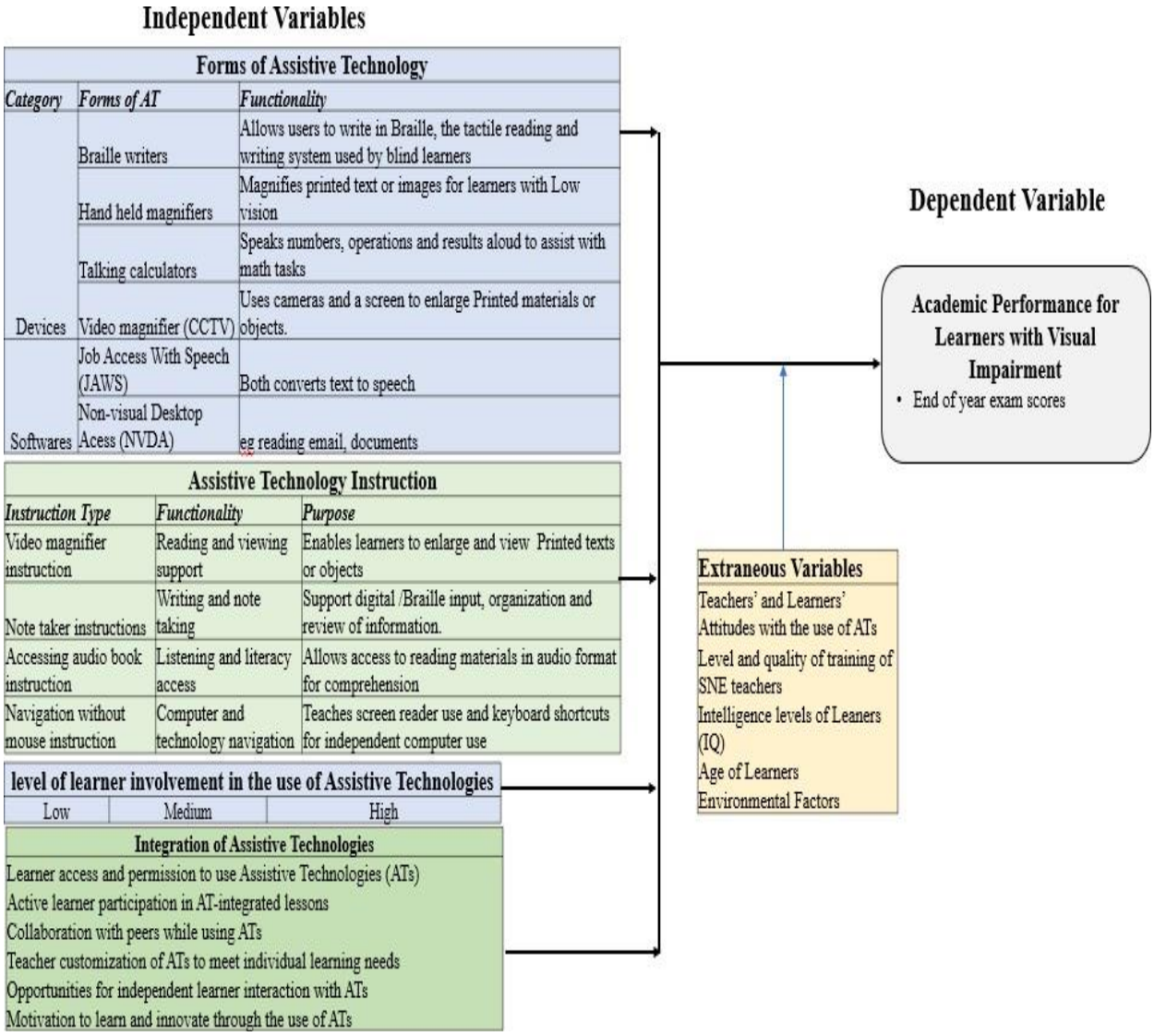

Figure 1. 1: Conceptual Framework

Source: Researcher (2024)

1.13 Operational Definition of Terms

Academic Performance: Refers to the measurable outcomes of a learner's academic work, typically evaluated through tests, assignments, and examinations. In this study, it includes the performance of learners with visual impairment in their school assessments

and examinations.

Assistive Technologies (ATs): These are tools, devices, or software designed to support and enhance the learning process for learners with disabilities. In the context of this study, assistive technologies include devices like braille writers, screen readers, and magnification software that aid learners with visual impairments.

Assistive Technology Instructions: These are the specific teaching methods and techniques used to instruct learners with visual impairments how to use assistive technologies. This can include hands-on training sessions, instructional videos, and guided practice sessions. Example video magnifier instructions, note taker instructions, accessing audio book instruction and navigating computer without a mouse.

Status of Assistive Technologies: This refers to the different types of assistive technologies available and used in the educational setting. Examples include braille displays, talking tablets, hand held magnifiers, Closed Circuit Television (CCTV), talking tablets, and screen readers.

Integration of Assistive Technologies: The process of incorporating assistive technologies into the regular teaching and learning activities to enhance the academic performance of learners with visual impairments.

Learners Attitudes: Comprises the positive or negative feelings and perceptions towards assistive technologies and their use in education. These attitudes can influence the effectiveness and acceptance of such technologies among teachers and learners (Marasinghe et al., 2015).

Learners Involvement: Refers to the degree and manner in which learners with visual

impairments engage with assistive technologies. This includes how actively they use the technologies in their learning processes and their participation in related instructional activities. Example engaged learners, team-oriented learners, individualized learners and self-directed learners.

Learners with Visual Impairment (LVI): Learners who have a significant vision loss that qualifies them for additional educational support. This condition cannot be corrected by conventional means such as refractive correction or medication, and includes both blind and low vision (LV) learners.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews existing research on the academic performance of learners with visual impairments. It examines the role of assistive technologies (ATs) in instruction and performance, the involvement of learners in their education, and the specific technologies commonly used in schools for students with visual impairments. It also explores the criteria used to select appropriate technologies that meet individual needs, the challenges encountered by both teachers and learners when integrating these technologies, and their overall effect on academic achievement. In addition, the chapter highlights gaps in the current body of knowledge and explains how this study intends to address them.

2.1 Academic Performance

Academic performance refers to the measurable outcomes of a learner's knowledge, skills, and competencies, typically evaluated through tests, assignments, practical activities, and national examinations (Brown & Addi, 2017; Brown et al., 2018). Every learner, regardless of disability, is expected to be assessed fairly without undue advantage or discrimination. For students with special needs, assessment tools include screening tests, IQ tests, curriculum-based assessments, adaptive behavior scales, behavior rating scales, and alternative end-of-grade examinations (Rose et al., 2018).

Visual impairment encompasses temporary or permanent loss of vision, ranging from partial, moderate, or severe impairment to complete blindness, resulting from damage to the eye or visual pathways in the brain (Musonda & Phiri, 2017). Learners with visual impairments often face unique academic challenges, yet their performance can still be reflected through literacy skills, auditory

learning, and examination results (Alshutwi et al., 2020). In many countries, legislation and policy frameworks have been enacted to promote equitable access to education for students with visual impairments.

Empirical studies consistently show that underperformance among these learners is linked to inadequate teaching and learning resources, lack of supportive environments at home and school, and negative community attitudes (Su et al., 2020). Other barriers include inaccessible school settings and teacher perceptions that hinder inclusion. Developed nations have attempted to counter these challenges through legal reforms, resource allocation, and inclusive practices. For example, in the United States, the early adoption of American Visual impairment has been associated with improved reading and comprehension outcomes among students with visual and related impairments (Hrastinski & Wilbur, 2020). Conversely, limited use of visual impairment has been linked to weaker performance (Hrastinski & Wilbur, 2016; Kun-man, 2017). In Hong Kong, Kun-man (2017) advocated for bilingual education incorporating visual impairment to improve outcomes, noting that the absence of specialized schools contributed to poor performance.

However, not all studies agree on the role of special schools. Khalid and Asghar (2021) reported that learners who attended mainstream schools demonstrated stronger speaking abilities and higher test scores, arguing that inclusive education fosters acceptance and belonging. Hrastinski and Wilbur's (2016) study was limited because it measured academic performance solely through reading skills, leaving out other indicators. More recent evidence from Onyango, Muthee, and Olewe (2024) in Nairobi County found that teacher professional qualifications significantly influenced the academic performance of learners with visual impairments, suggesting that teacher quality is a critical determinant of outcomes.

Other factors influencing performance include learning environments, communication methods, and

family support (Su et al., 2020). In Africa, education for all children has been recognized in policy frameworks (Marriela et al., 2015). Studies across Zambia, Malawi, Nigeria, Ethiopia, and Tanzania (Cobinna et al., 2017; Khomera et al., 2020; Kumatongo et al., 2021) consistently link underperformance to teacher-related factors, unfriendly curricula, lack of visual impairment teachers, inadequate facilities, and poor access to assistive technologies (Mundo & Penda, 2020; Musonda & Phiri, 2017). In Zambia, Mundo and Penda (2020) called for policies that adapt assessment methods for learners with visual impairments, moving beyond conventional formats that favor sighted students. However, they did not address the role of assistive technologies in such assessments, leaving a gap that this study seeks to explore. Similar challenges, including resource shortages, inadequate training, and lack of supportive infrastructure, have been reported in Ethiopia (Desalegn & Worku, 2016) and Tanzania (Chizigwa, 2018; Rishaelly, 2017).

Recent studies have also emphasized the role of assistive technologies in improving academic outcomes. Kiprotich (2023) found that electronic Braille note-taking devices significantly enhanced learners' ability to access curriculum content in Kenyan special schools, though attitudes varied depending on exposure and training. International reviews highlight evidence-based practices such as screen readers, tactile graphics, and digital learning platstatus as effective strategies for promoting inclusion and performance (International Journal of Special Education, 2023).

The use of visual impairment, oral communication methods, and positive teacher and learner attitudes has been shown to significantly affect performance (Kun-man, 2017; Wilbur, 2016; Kumatongo et al., 2021). However, many of these studies are based on small samples, limiting generalizability. Gender differences have also been observed, with performance varying between boys and girls depending on context (Chinaka & Osisanya, 2020; Si et al., 2020).

In Kenya, inclusive education and the official recognition of Kenya Visual impairment demonstrate

government commitment (Kalya et al., 2020; Kathare, 2020). Yet, teacher shortages and limited use of assistive technologies remain major obstacles. While several studies have explored inclusive education and visual impairment, very few have investigated how assistive technologies affect academic outcomes (Mwanyuma, 2016; Nyambere & Okello, 2021; Yabbi, 2015). This lack of research, combined with recurring underperformance despite policy efforts, justifies the current study's focus on the role of assistive technologies in improving performance among secondary school learners with visual impairments in South Rift Counties.

2.2 Status of Assistive Technologies

Empirical studies across different contexts have consistently highlighted the role of assistive technologies in enhancing academic performance for learners with visual impairments. Mason (2014), in a large-scale study involving 280 teachers and 368 learners in Texas, examined the integration of mobile technologies, particularly iPads, into classroom instruction. The findings revealed that 98.5% of learners considered iPads very important for their learning, with 327 students rating them as extremely useful for curriculum access. However, teachers expressed mixed confidence levels, with only 10% fully confident in their use of assistive technologies. This study underscores the transformative potential of mobile devices in supporting visually impaired learners, while also pointing to the persistent challenge of teacher preparedness. Importantly, Mason's work was situated in a resource-rich environment, contrasting sharply with contexts such as Kenya, where assistive tools are often imported, costly, and insufficient to meet demand.

Similar challenges were observed in a comparative study by Mugo (2013) between Kenyatta University in Kenya and Syracuse University in the United States. Visually impaired students in both institutions relied heavily on Braille machines as their primary writing tools, with limited exposure to computers. Many students avoided digital technologies due to lack of training and

confidence, requiring sighted assistance for orientation. Mugo concluded that reluctance to adopt assistive technologies was not due to unwillingness but rather inadequate exposure and training. Once learners and teachers gained confidence, these technologies became indispensable for accessing information, highlighting the importance of capacity building in technology adoption.

Technological advances have expanded communication options for visually impaired learners through touch, speech, and residual vision. Alves et al. (2009) documented the development of hardware and software tools such as screen readers, which convert text into synthesized speech, enabling independent study. The National Centre for Tactile Diagrams (2011) catalogued tools including the Duxbury Braille Translator, JAWS for Windows, Dolphin Pen, NVDA (Non-Visual Desktop Access), and tactile devices such as the Optacon, which allow tactile reading of printed materials. These tools reduce reliance on sighted guides and increase curriculum accessibility, though their effectiveness depends on careful assessment of individual learner needs.

Recent empirical studies have emphasized the growing role of artificial intelligence (AI) and mobile applications in assistive technology. Muhsin et al. (2023) reviewed substitutive assistive tools and highlighted advancements in AI-powered screen readers, computer vision systems, and IoT devices that support navigation, text recognition, and real-time feedback for learners with visual impairments. Similarly, Mashilo and Iyamu (2024) found that mobile applications tailored for visually impaired students in South Africa improved participation in computing and engineering courses, though challenges remained in selecting appropriate tools and ensuring usability. These findings suggest that the future of assistive technology lies in intelligent, adaptive systems that go beyond traditional Braille and magnification devices.

The importance of individualized assessment in technology selection has been emphasized by Kelly (2018), who argued that assistive technologies should be chosen based on both present and future

needs. This aligns with earlier studies by Abner and Lahm (2012), Edwards and Lewis (1998), and Zhou et al. (2019), which stressed the integration of assistive tools into individualized education plans to maximize their effectiveness. More recent work by Smith et al. (2019) also highlighted that adoption is influenced by usability, learnability, and adaptation time, reinforcing the need for ongoing teacher training and learner support.

Policy frameworks play a critical role in ensuring equitable access to assistive technologies. In the United States, legislation such as the Individuals with Disabilities Education Act (IDEA, 2019) and the No Child Left Behind Act (NCLB, 2021) mandate that school districts provide learners with disabilities access to appropriate assistive devices. In Kenya, the Ministry of Education, alongside county and sub-county assessment centers, is tasked with ensuring that learners with visual impairments receive the technologies they need (Nyambere & Okello, 2021; Mwanyuma, 2016). Despite these commitments, shortages of assistive tools, inadequate teacher training, and limited infrastructure remain significant barriers to effective implementation.

Taken together, these empirical studies demonstrate that while assistive technologies such as Braille machines, screen readers, tactile devices, and mobile applications have proven effective in enhancing curriculum access and independence, their success depends on contextual factors such as teacher preparedness, resource availability, and supportive policy frameworks. The emerging integration of AI and mobile technologies offers promising opportunities, but without adequate training and equitable distribution, learners in resource-limited contexts such as Kenya may continue to face barriers to full participation in education.

2.3 Assistive Technologies Instructional Supports

Teaching in integrated classrooms presents unique challenges because instruction must be more individualized compared to regular settings, where learners' needs are relatively uniform (Peters, 2021). For students with visual impairments, the degree of sight loss varies, leading to diverse

learning needs and requiring tailored strategies (Salisbury, 2018). Teachers therefore need to understand these differences in advance and plan suitable approaches that enable effective learning (Salisbury, 2008). Research consistently suggests that high-quality teaching, especially when inclusive of diverse learners, plays a crucial role in improving academic outcomes (Mastropieri & Scruggs, 2020).

Empirical studies highlight the importance of cooperative learning in integrated classrooms. Mastropieri and Scruggs (2020) demonstrated that group tasks, where students collaborate in small teams, improve academic performance by fostering peer support. Mitchell (2018) similarly observed that cooperative learning strategies benefit visually impaired students in mixed-ability settings, as peer interaction enhances comprehension and confidence. However, while these strategies appear effective, existing studies have not clearly established a direct causal link between cooperative methods and academic performance outcomes for learners with visual impairments. More recent evidence from Alqaryouti (2022) in Oman found that cooperative learning combined with assistive technologies significantly improved literacy and numeracy outcomes among learners with disabilities, suggesting that instructional supports are most effective when paired with technology.

The teaching methods applied in classrooms with visually impaired students can significantly influence their performance. Mitchell (2019) found that collaborative teaching approaches in the United States supported both learners with and without disabilities, while Kravetz (2016) reported a notable rise in exam pass rates among learners with disabilities after the introduction of collaborative teaching. Improvements were observed across subjects, including mathematics, science, and social studies. More recent findings by Onyango, Muthee, and Olewe (2024) in Kenya revealed that teacher preparedness and instructional adaptation were strongly correlated with improved performance among visually impaired learners, underscoring the importance of professional development in

inclusive pedagogy.

Instructional materials also need to be adapted to meet learners' needs. Printed text can be modified by enlarging fonts, increasing contrast, bolding characters, or adjusting spacing. Learners with low vision may also require copies of notes displayed on the board or projected in class. Teachers specializing in visual impairment can provide additional clarification, or pre-teach lessons before the main session (Spungin, 2022). UNESCO (2021) recommends that teachers use larger characters and colored chalks when writing on boards to enhance clarity. Recent studies confirm the effectiveness of adapted instructional materials: Kiprotich (2023) found that electronic Braille note-taking devices and enlarged print materials significantly improved curriculum access for learners in Kenyan special schools. Similarly, Muhsin et al. (2023) highlighted that AI-powered screen readers and tactile graphics improved comprehension and reduced reliance on sighted assistance.

Despite these advances, most of the studies have been conducted outside Kenya, and few have directly assessed how adapting instructional materials affects academic performance in local contexts. This gap highlights the need for research within Kenya, particularly on the role of adapted instruction and assistive technologies in supporting learners with visual impairments. Recent policy reviews emphasize that while Kenya has recognized Kenya Visual impairment and inclusive education frameworks (Kalya et al., 2020; Kathare, 2020), shortages of trained teachers and limited access to assistive technologies remain major obstacles. Addressing these challenges requires context-specific empirical studies that evaluate how instructional supports can be effectively integrated into secondary school classrooms.

2.4 Learners Involvement in the Use of Assistive Technologies

Learner involvement has long been recognized as a critical determinant of academic achievement. A systematic review in the United States concluded that students' active participation has a strong

positive effect on their performance, with engagement linked to improved motivation, skills, and behavior (Nye, Turner, & Schwartz, 2020). Much of this evidence highlights the benefits of parental and learner engagement in both school-related and general academic activities (Pomerantz et al., 2021). Longitudinal studies further indicate that learners who are actively involved from an early age tend to maintain higher achievement levels even in later grades (Barnard, 2004). However, findings at secondary and post-secondary levels have been mixed. While some studies reported little or no direct link between involvement and achievement (Fan, 2021; Bronstein et al., 2015), others found positive correlations (Grolnick et al., 2020; Hill et al., 2020). Importantly, these studies were general in scope and did not specifically address learners with visual impairments.

When considering students with disabilities, empirical evidence remains limited. Most studies have measured levels of involvement descriptively or compared involvement between learners with disabilities and those in general education. Some research suggests that involvement levels are similar across the two groups (Gerstein, 2020; Strobel et al., 2016). Rogers et al. (2019) found that general education students showed slightly higher engagement in areas such as homework assistance and parent-teacher meetings. However, few studies have directly linked involvement to academic achievement for students with disabilities. Two unpublished dissertations in the United States addressed this gap, showing that parent-school contact and volunteer activities were significant predictors of achievement among learners with emotional and learning disabilities. Interestingly, frequent school-initiated communication was sometimes linked to lower achievement, while broader parental involvement, such as volunteering, was associated with better outcomes (Rogers et al., 2019; Gerstein, 2020).

In Africa, research on learner involvement in supporting students with disabilities is scarce. Ukeli and Akem (2021) found a positive association between involvement and academic performance

among secondary school students with disabilities in Nigeria, noting that involvement had long-term effects in sustaining performance improvements. More recent evidence from Ethiopia and Tanzania highlights that learner engagement, when combined with assistive technologies such as screen readers and tactile graphics, significantly improves curriculum access and performance outcomes (Chizigwa, 2018; Rishaelly, 2017; Muhsin et al., 2023). In Kenya, however, little has been done to examine this issue among learners with visual impairments, particularly in secondary schools. Kiprotich (2023) reported that electronic Braille note-taking devices improved learner engagement and performance in special schools, but broader studies on involvement remain lacking.

Teacher and community attitudes also play a significant role in shaping learner involvement. In Malaysia, Ali, Mustapha, and Jelas (2019) reported generally positive teacher attitudes toward integration, though the link to academic performance was not established. Similar findings were observed in Bangladesh, where teachers expressed willingness to support inclusive education but lacked clarity on implementation strategies (Rahaman & Sutherland, 2022). Attitudes, however, are not always positive. Bevan-Brown (2022) and Rahaman and Sutherland (2022) documented resistance and even hostility among some teachers toward integrating learners with special needs. Gender differences have also been noted; for example, Odongo (2021) found that female teachers in Tanzania expressed reluctance to pursue further training in special needs education. While some studies in Nigeria and Zimbabwe reported largely positive teacher attitudes (Maunganidze & Kasayira, 2022; Hungwe, 2021), others highlighted mixed or negative responses.

Recent studies emphasize that learner involvement in assistive technology use is most effective when supported by teacher training and inclusive policies. Onyango, Muthee, and Olewe (2024) in Nairobi County found that teacher preparedness and learner engagement with assistive technologies were strongly correlated with improved academic performance among visually impaired learners.

Similarly, Mashilo and Iyamu (2024) reported that mobile applications designed for visually impaired students enhanced learner participation in computing courses in South Africa, though usability challenges persisted. These findings underscore the importance of contextual research in Kenya, where shortages of assistive tools and limited teacher training remain obstacles.

Overall, the literature presents inconsistent findings on teacher and learner involvement, particularly in relation to academic outcomes for students with visual impairments. While international studies highlight the benefits of engagement, empirical evidence in Kenya remains scarce. This gap underscores the importance of the present study, which seeks to examine how learner involvement in the use of assistive technologies influences academic performance among secondary school learners with visual impairments in South Rift Counties.

2.5 Knowledge Gap

The reviewed literature on the academic performance of learners with visual impairments highlights several recurring themes, including the role of assistive technologies, instructional supports, learner involvement, and teacher attitudes. While assistive technologies such as iPads, screen readers, and Braille devices have been shown to enhance curriculum access and independence in developed countries (Mason, 2014; Muhsin, Qahwaji, Ghanchi, & Al-Taee, 2023), teachers often report feeling underprepared to integrate these tools effectively into instruction (Mashilo & Iyamu, 2024). This underlines a persistent challenge: technology availability alone does not guarantee improved outcomes unless accompanied by adequate training and pedagogical adaptation.

In African contexts, studies from Zambia, Nigeria, Malawi, Ethiopia, and Tanzania consistently identify barriers such as shortages of resources, lack of trained teachers, unfriendly curricula, and limited access to assistive devices (Cobinna, Khomera, & Kumatongo, 2017; Mundo & Penda, 2020; Chizigwa, 2018; Rishaelly, 2017). These findings suggest that systemic issues rather than learner

ability often hinder performance. In Kenya, despite progressive policies promoting inclusive education and the recognition of Kenya Visual impairment (Kalya, Kathare, & Mutua, 2020), challenges remain acute. Teacher shortages, inadequate training in assistive technology use, and limited infrastructure continue to restrict learners' access to equitable education (Nyambere & Okello, 2021; Kiprotich, 2023).

The literature also emphasizes the importance of learner and parental involvement in academic achievement. Engagement has been linked to improved motivation, behavior, and long-term performance (Nye, Turner, & Schwartz, 2020; Pomerantz, Moorman, & Litwack, 2021). However, most of these studies are general in scope and do not specifically address learners with visual impairments. Evidence from Nigeria suggests that involvement positively influences performance among students with disabilities (Ukeli & Akem, 2021), but similar studies in Kenya remain scarce. This gap is particularly significant given that learner involvement in assistive technology use has been shown to enhance participation and achievement in other contexts (Onyango, Muthee, & Olewe, 2024).

Teacher and community attitudes further shape the integration of learners with visual impairments. While some studies report positive attitudes toward inclusive education (Ali, Mustapha, & Jelas, 2019; Maunganidze & Kasayira, 2022), others highlight resistance or reluctance, particularly in resource-constrained environments (Bevan-Brown, 2022; Rahaman & Sutherland, 2022). In Kenya, teacher preparedness and attitudes remain inconsistent, with limited empirical evidence on how these factors interact with assistive technology adoption to influence learner performance.

Overall, the literature reveals several critical gaps. First, many studies focus broadly on disabilities without examining visual impairment specifically, thereby overlooking the unique challenges faced by this group. Second, while performance outcomes have been studied, few investigations explore the

role of assistive technologies in depth, especially in secondary school contexts. Third, most research in Kenya has concentrated on inclusive education policies and visual impairment recognition, with little attention to how assistive technologies directly affect academic performance among learners with visual impairments. Finally, emerging technologies such as AI-powered screen readers, mobile applications, and electronic Braille devices have been studied in other regions (Muhsin et al., 2023; Mashilo & Iyamu, 2024), but their impact in Kenyan classrooms remains unexplored.

This knowledge gap provides the basis for the present study, which seeks to investigate the impact of assistive technologies on academic performance among secondary school learners with visual impairments in South Rift Counties. Addressing this gap, the study aims to contribute context-specific evidence that can inform policy, teacher training, and resource allocation in Kenya's inclusive education framework.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

The section offers insights into the designs and approaches that explain the ways the researcher intends to carry out the study. The section is a systematic and logical plan with the intent to resolve a research problem to ensure valid and reliable results are attained (Kumar, 2010). The section discusses location of the study, the research paradigm, the research methodology, the research design, the target population, the sample size and sampling procedures, data collection instruments, validity, reliability, data collection procedures, data analysis procedures and ethical considerations.

3.1 Research Paradigm

The set of beliefs, ideas, or understanding within which practices and theories can function makes up the research paradigm (Rehman & Alharthi, 2016). The different paradigms that can be adopted in a study include the positivism, realism, pragmatic, and interpretivism research paradigms. This study made use of the pragmatic paradigm due to the use of both the qualitative and quantitative approaches.

Kaushik and Walsh (2019), note that pragmatism emerged between the late 19th century and early 20th century with the method emphasizing action-oriented inquiry, practical consequences, and utility. The method emphasizes the outcomes of the actions, beliefs, and theories together with the practical consequences. The use of the method was appraised by Allemang et al. (2022), who notes that the method has its emphasis on the validity of ideas and truths being used in the achievement of the desired outcomes. The method further

advocates for the integration of theory into practice thus offering an opportunity for refining theories based on the practical outcomes and empirical observations.

Maarouf (2019), advocates for the use of the method through the aspect of the researcher having the opportunity to use different viewpoints and adapt the approaches to adequately fit the specific goals. This is made possible through the act of the method acknowledging that actions and knowledge occur in diverse ways. The method further notes that beliefs and knowledge are tentative and subject to revision based on experiences or new evidence (Kelly & Cordeiro, 2020). The openness creates room for continuous improvement and learning in practice and understanding.

Kivunja & Kuyini (2017), however, critiqued the method due to its major focus on the practical aspect than the theoretical viewpoint. This in turn results in the different essential frameworks being overlooked reducing the validity of the study. The method also focuses on problem-solving and practical outcomes that can result in short-term focus on the problems. As such, this results in long-term consequences and deeper issues being neglected. Both the deductive and inductive approaches were utilized to ensure specificity and generalization was achieved.

3.2 Research Methodology

The framework used in fulfilling the research objectives in a manner that ensures coherence is achieved makes up the research design. The study made use of the mixed method research methodology which is an integration of both the quantitative and qualitative research design. Morse (2016), appraised the use of the mixed-methods design due to the use of both primary and secondary data that increases the efficiency of the operations. Triangulation by using

both qualitative and quantitative methods, researchers can cross-verify the results this enhances validity and reliability of the study findings (Creswell, 2011).

Schoonenboom & Johnson (2017), however, critiqued the method due to its time-consuming nature which can result in the researcher missing out on essential information. Further, the method requires unique expertise for the integration of both qualitative and quantitative data. This can result in a reduction in the reliability and quality of the findings.

3.3 Research Design

Research design is defined as plans and procedures for research that span the decision from broad assumptions to detailed methods of data collection and analysis (Creswell, 2013). This study adopted the concurrent triangulation mixed-method research design which involves gathering both quantitative and qualitative data at the same time, analyzing the databases separately, comparing the results from both datasets and then making interpretations and conclusions at interpretation phase. The direct comparison of the two databases provides a convergence of the data sources (Creswell, 2017).

The major strength of this design is that it combines the advantages of each form of data; quantitative data provides for generalizability whereas qualitative data offers information about the context or setting. However, the designs weakness is that a lot of expertise is required since data is collected at the same time using different tools and also combining of the two data sets.

The design was suitable for this study since it allowed the researcher to collect data on the independent variables using both qualitative and quantitative tools in form of interview

schedules and questionnaires. This allowed for adequate data to be collected and ensured more accurate findings due to the triangulation of the different data sets.

3.4 Location of the Study

This study was conducted in South Rift Counties, located in the South Rift region of Kenya. Kericho is one of the counties in the former Rift Valley Province and lies approximately 260 kilometers northwest of Nairobi. Geographically, the county features green, hilly terrain and a cool climate, largely influenced by its location on the western side of the Mau Escarpment. It is widely known for its tea plantations and plays a significant role in Kenya's agricultural sector. South Rift Counties shares borders with several other counties: Nandi County to the north, Bomet County to the south, Nakuru County to the east, and Kisumu and Nyamira counties to the west. Administratively, it is divided into six sub-counties: Ainamoi, Belgut, Bureti, Kipkelion East, Kipkelion West, and Soin/Sigowet. These sub-counties encompass a mix of rural and semi-urban communities with varying degrees of access to educational infrastructure and services.

The study focused on three integrated secondary schools within the county that admit learners with visual impairments. At the time of the study, Kericho had a limited but notable number of such institutions, distributed across different sub-counties and offering a mix of boarding and day school settings. South Rift Counties was chosen for its unique combination of factors relevant to the research. Its blend of rural and semi-urban environments provided a chance to observe inclusive education in settings with differing levels of resources and infrastructure. In addition, the presence of established integrated schools with experience in supporting learners with visual impairments created a practical basis for examining the role of assistive

technologies in academic settings. The county's investment in special units and teacher training for inclusive education further supported its suitability as the study site.

3.5 Target Population

The target population refers to the specific group of individuals from which the study draws data and to whom the findings will be generalized (Stratton, 2021). Krejcie and Morgan (1970) define the population as the total group of individuals or cases that meet a set of specifications relevant to the research problem.

In this study, the target population consisted of 68 individuals drawn from selected schools in South Rift Counties, Kenya. This included 3 principals, 10 special needs education (SNE) teachers, and 55 learners with visual impairments. These schools were selected based on their inclusive education practices and enrolment of learners with visual impairments. Table 3.1 presents the distribution of the target population for the study.

Table 3. 1: Target Population

SCHOOLS	LEARNERS WITH VISUAL IMPAIRMENT	SNE TEACHERS	PRINCIPAL
KIPSIGIS GIRLS	5	2	1
KORARA	33	5	1
KIRIBA	17	3	1
TOTAL	55	10	3

3.6 Sample Size Determination and Sampling Procedure

Taherdoost (2017) define a sample size as the number of observations and participants used in a study with the results being inferred from the general population. The study sample was

drawn based on the guidelines of Krejcie and Morgan (1970), who provide a statistical table for determining appropriate sample sizes for given population sizes. According to the model, a sample size of 48 is sufficient to represent a population of 55 learners. This approach enhances the validity of the findings while keeping the data manageable and focused. The study utilized a final sample of 55 individuals comprising of: 3 principals, 5 special needs teachers, and 48 learners with visual impairment as shown in Table 3.2.

Table 3. 2 Sample size

Category	Target Population	Sample Size
Principal	3	3
Special Need Teachers	10	5
Learners with Visual Impairment	55	48
Total	**68**	**56**

The two school principals were purposively selected due to their leadership roles and comprehensive understanding of institutional practices within the respective study sites. Likewise, special needs teachers were purposively sampled based on their direct engagement with learners with visual impairments and their specialized knowledge concerning the use of assistive technologies in inclusive classroom settings. According to Wallen and Fraenkel (2012), purposive sampling is appropriate when selecting individuals who possess specific characteristics relevant to the study objectives. Finally, stratified random sampling was employed to select learners with visual impairments in order to obtain a representative cross-sectional sample from the selected schools, thereby enhancing the generalizability of the findings within the study context. Table 3.3 shows the summary of the sampling frame.

Table 3. 3 Summary of Sample Size and Sampling Technique

Category	Target Population	Sample Size	Sampling Technique
Principal	3	3	Purposive Sampling

Special Need Teachers	10	5	Purposive Sampling
Learners with Visual Impairment	55	48	Stratified random Sampling
Total	**68**	**56**	

3.7 Research Instruments

The research instruments used in the study were questionnaires, interviews, and observation schedules. The instruments were utilized to ensure adequate data collection since the multi-technique approach supplements one another (Mwiria & Wamahiu, 1995). The choice of instruments was guided by the nature of the data collected and the objectives of the study.

3.7.1 Questionnaires

According to Patten (2016), questionnaires comprise of different prompts or sets of questions that have been formulated in line with the study objectives. The use of questionnaires offers the opportunity for the attainment of ease in the collection process ensuring quality is attained. Orodho (2004), appraised the use of the method due to the reduction of biasness as the respondent is not coerced into answering the questions in a specific manner. Through the questionnaires, the researcher had an opportunity to involve learners with visual impairment to ascertain the functionality of assistive technologies used in the learning process.

The research utilized structured questionnaires that ensured that the statements and questions presented were in line with the set objectives. Cheung (2021), appraised the use of the method as it creates room for clear and concise language to be used. Further, the method creates room for response options that are collectively exhaustive and mutually exclusive. The study used the five-point Likert scale in the guidance of the section. According to the scale, 5 signified strongly agree (SA), 4 represented Agree (A), 3 represented uncertainty (U), 2 showcased disagreement (SD), and 1 represented strong disagreement (SD).

3.7.2 Interview Schedule

The researcher used a set of questions from the schedule that provided a guide for the direction of the study. The researcher used probing to clarify issues obtained for further information that enriched the data. This made it possible for the researcher to obtain the data from the teachers and the principal required to answer the specific objectives of the study. The researcher standardized the interview as they followed a pattern uniform for all respondents (Orodho, 2005).

The researcher opted for this instrument because of its consistency in data collection. The interview schedules were designed for the Head teacher and others were for the special needs' teachers teaching computer lessons who interact most frequently with learner's visual impairment, the learning materials, and the environment. They were designed to gather information on the true nature of learners and how they consider modern assistive technology and old technologies.

3.7.3 Observation Checklist

The researcher prepared an observation checklist as a primary data collection instrument to systematically evaluate the use and effectiveness of assistive technologies supporting learners with visual impairments. This checklist provided a structured means to observe specific behaviors, assess technology usage, and capture student participation levels within the classroom.

In the design and development of the observation checklist, items were selected based on the study's objectives and guided by a review of relevant literature, alongside consultations with experts in assistive technology and special education. The checklist covered several categories, such as technology availability, functionality, usage frequency, and observed

effectiveness. For instance, items included types of technology available, student engagement during technology use, and proficiency with adaptive equipment like braille displays and specialized keyboards.

The procedure for using the checklist involved observing learners during scheduled computer and regular classroom lessons, allowing for a comparison of engagement levels and technology usage across different learning contexts. Observations were conducted over a specific period to capture varied lesson types and student interactions. The researcher completed the checklist in real-time to ensure immediate and accurate data collection.

The checklist offered several advantages. First, its structured format enhanced consistency in data collection, ensuring that all observers looked for the same behaviors or events, which improved the reliability of findings (Gawande, 2009). The checklist also allowed for efficient data collection, making it quicker and easier to record observations especially valuable in a time-sensitive environment like the classroom (Patton, 2002). Additionally, by providing clear criteria for each item, the checklist helped minimize observer bias, reducing the influence of personal beliefs or expectations on data collection (Creswell & Creswell, 2017).

However, the checklist also had limitations. Its structured format could be restrictive, as it focused on predetermined behaviors and limited the flexibility to capture unexpected behaviors or contextual details that may be relevant to the study (Angrosino, 2007). Moreover, the checklist's focus on the presence or absence of specific behaviors sometimes led to superficial data collection, as it did not explore the underlying reasons or context for these behaviors (Silverman, 2013). Observer fatigue posed another challenge, especially when using a lengthy checklist or conducting extended observations, which could lead to errors or omissions (Robson & McCartan, 2016). Finally, checklists have limited

applicability in complex environments where behaviors and events are dynamic; in such contexts, they may oversimplify observations, potentially missing intricate interactions and yielding incomplete data (Yin, 2017).

3.7.4 Document Analysis

Document analysis was used to supplement data collected from other sources. In this study, end-of-year student performance records were reviewed to assess the academic performance of learners with visual impairment (LVI) in the selected integrated secondary schools. These records provided objective evidence of trends in academic outcomes over time and helped establish any links between the use of Assistive Technologies (AT) and student performance. The analysis focused on comparing results across schools with varying levels of AT integration.

3.8 Validity and Reliability

The study made use of different control features and check-lists to ensure reliability and validity were achieved.

3.8.1 Validity

The degree to which a research instrument correctly measures the intended goals and targets makes up validity (Frankel & Wallen., 2009). The validity is measured by the meaningfulness and accuracy of the different inferences used in the study based on the research results. The instrument in this study was validated in terms of the construct, content, and face validity.

Cohen et al. (2017), note that content validity entails the extent to which the complete intended content is covered while face validity entails the aspect of an instrument appearing to measure the intended content. The above concepts were achieved through constant reviews

and discussions with the supervisors and my peers to review whether the questions had been arranged logically and systematically. This was also guided by the study objectives that provided the direction for the questions and statements that were provided to the respondents. Piloting of the instruments further enhanced the validity as they aided in the identification of the different gaps and ensured the objectives aligned with the set statements and questions.

3.8.2 Reliability

The aspect of the research instrument providing consistent results multiple times after the trial periods makes up for reliability (Ahmed & Ishtiaq, 2021). Reliability ensures that the researcher receives consistent results that in turn increases the quality of the discussions. The questionnaire was piloted with a sample of 10 learners with visual impairments from Thika High School for the Blind. This school was selected due to its longstanding experience in educating students with visual impairments, making it an appropriate setting for pre-testing the instrument. The piloting process allowed for refinement of the questionnaire items to eliminate ambiguity and enhance clarity.

Following the pilot, Cronbach's alpha was calculated to determine the internal consistency of the instrument. The result yielded a coefficient of 0.84, which is above the recommended threshold of 0.70, indicating high reliability (Hair et al., 2019). This suggests that the questionnaire items were well-aligned in measuring the intended constructs. The researcher also clearly documented the data analysis and generation techniques for ease in the external auditors reviewing the reliability. Further, the researcher established that the responses were done by the participants with no external influence determining the responses provided. This increased the reliability of the responses as they were done in confidentiality by the respondents.

3.8.3 Ensuring Trustworthiness

Trustworthiness and authenticity are crucial in every qualitative research as they ensure the findings are credible and a true reflection of the study phenomenon (Yin, 2016). Ensuring the trustworthiness of qualitative findings in this study involved focusing on four main criteria: credibility, transferability, dependability, and confirmability. These criteria, as articulated by Lincoln and Guba (1985) as cited in Anney (2014), are essential for establishing rigor in qualitative research and ensuring that the findings are credible, reliable, and meaningful.

Credibility refers to the accuracy and believability of the findings from the perspective of the participants. To enhance credibility in this study, triangulation was employed by using both interviews and observation checklists as data collection tools. Triangulation allowed the researcher to cross-check findings from multiple sources, thereby increasing the robustness of the data. Additionally, member checking was conducted, where participants were invited to review and verify the accuracy of the data collected from them. This process helped to validate the findings and provided an opportunity for participants to correct any potential misinterpretations. Prolonged engagement in the field also contributed to credibility by allowing the researcher sufficient time to understand and accurately capture a true picture of the learning environment for learners with visual impairments.

Transferability pertains to the extent to which findings can be applied to other contexts or settings. To support transferability, the researcher provided a thick description of the research context, participants, and data collection process, offering detailed insights into the classroom settings, the types of assistive technologies observed, and the ways in which they were used by learners. Such rich descriptions allow other researchers and practitioners to assess the

applicability of the findings to their own settings (Shenton, 2004). Additionally, clear criteria for sample selection specifically, the selection of special needs teachers who had the most frequent interactions with visually impaired learners and assistive technologies ensured that participants were representative of those with relevant experiences, thus enhancing the study's relevance to similar educational settings.

Dependability focuses on the stability and consistency of the research process over time. To ensure dependability, the researcher employed and kept an audit trail by thoroughly documenting each phase of the research process, including the development of the interview schedule, construction of the observation checklist, and analysis of the data collected. This comprehensive documentation provides transparency, allowing others to follow the methodological decisions made throughout the study.

Confirmability addresses the degree to which findings are shaped by the participants and the data rather than researcher bias. To enhance confirmability, the researcher maintained a reflexive journal to document personal reflections, decisions, and potential biases throughout the research process. This practice helped the researcher remain aware of her own assumptions and minimized the potential for these to influence data interpretation Furthermore, using a structured observation checklist with standardized criteria helped reduce observer bias, as the researcher focused on predefined behaviors rather than subjective interpretations.

3.9 Data Collection Procedures

The researcher started by obtaining a consent letter from the School of Education, Moi University which was used to seek for a research permit from the National Council for Science Technology and Innovation (NACOSTI). The researcher further sought permits from

the Ministry of Education in South Rift Counties to allow the researcher to carry out the study in the selected schools. Once the permits were obtained, the researcher used formal writing to communicate to the principal of Kipsigis Girls, Korara and Kiriba Integrated Secondary School specifying the intent and reasons for the study which was mainly academic purposes. The researcher then proceeded and visited the schools to establish a rapport and sought permission from the administration then carried out the study.

Both the quantitative and qualitative approaches were used in the data collection with interview guides and questionnaires being utilized. The researcher engaged services of a qualified research assistant to carry out the entire data collection process. Prior to data collection, a comprehensive training was conducted to prepare the research assistant on the study's objectives, the use of research tools (questionnaire, interview schedule and observation checklist), and ethical standards. The research assistant first started issuing the questionnaires in person to the teachers who oversaw the learners answering the questions and statements provided. This was deemed appropriate due to the high return rate of the questionnaires that is associated with the face-to-face method.

The research assistant then proceeded to book the interviews with the teachers. This aided in the creation of a more relaxed atmosphere for the response to the provided questions without interfering with the normal programs. Each conversation was scheduled for 30 to 40 minutes which was characterized by note-taking and recording for future reference. The research assistant maintained a standardized approach as per established guidelines, while organizing and reviewing data daily to ensure quality and completeness.

3.10 Data Analysis Procedures

3.10.1 Quantitative Data Analysis

Wickham and Wickham (2016), defines data analysis as the process of using logical techniques and systematic methods in the application of the statistical data to illustrate, describe, evaluate, and condense data. The researcher collected, sorted, edited, sorted, classified, and tabulated the data for the analysis process.

Quantitative data collected from the questionnaires was sorted with complete questionnaires being classified together. The data was analyzed with descriptive statistics such as tables, and percentages and linear regression analysis. The findings from both sets were then categorized for analysis and interpretation by the researcher.

3.10.2 Qualitative Data Analysis

Qualitative data analysis involves reducing large volumes of raw data into meaningful patterns and themes by distinguishing relevant information, identifying trends, and building a framework to interpret the findings (Patton, 2014). Creswell (2012) outlines six common steps in this process: preparing and organizing data; initial exploration through coding; developing themes; presenting findings in narrative or visual form; interpreting meaning based on personal reflection and literature; and validating the findings.

Similarly, Braun and Clarke (2006) provide a practical six-step approach: transcribing data, familiarizing oneself with it, coding in multiple phases, and producing a final report. This study adopted thematic analysis based on these frameworks to analyze qualitative data from interviews. Thematic analysis was selected because it is well-suited for understanding experiences, behaviors, and perspectives across a data set (Braun & Clarke, 2012). It involves not just organizing and labeling data, but also interpreting and transforming it into

meaningful insights through the development of themes. Figure 3.1 shows the six-step thematic analysis framework.

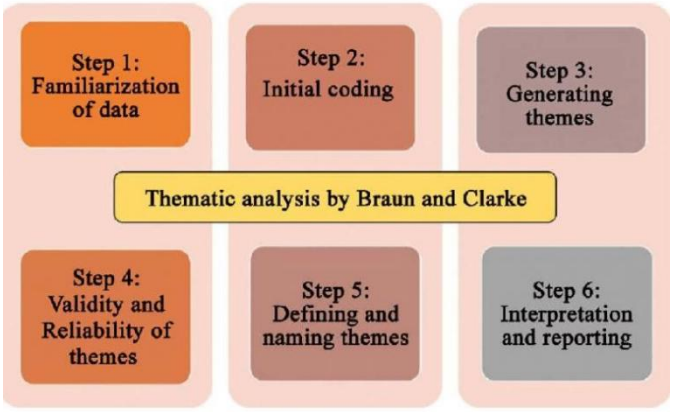

Figure 3. 1: Thematic Analysis Framework.

Source: Adopted from Braun and Clark's (2006)

3.11 Ethical Considerations

This study followed established ethical principles throughout its implementation. Ethical issues in research refer to the responsibility of the researcher to respect participants' rights, values, and well-being (Creswell, 2014). Observing these principles protects participants, builds trust, ensures integrity, and minimizes the risk of misconduct. Creswell (2014) notes that ethical practice requires researchers to explain study objectives clearly, obtain research approval from academic and regulatory bodies, provide accurate information to participants, and respect their wishes in how data is reported.

The American Educational Research Association (AERA, 2011) highlights specific standards that guide ethical research. These include protecting participants from harm, ensuring confidentiality, and obtaining informed consent. Following these principles, this study began by obtaining a research permit from Moi University, then securing approval from the National Commission for Science, Technology, and Innovation (NACOSTI) and

the South Rift Counties Education Office. The head teacher of the selected school also granted permission for the study to take place.

The researcher obtained informed consent from all participants, including learners with visual impairments, the head teacher, and teachers. Each participant signed a consent form after being fully informed of the study's purpose and their expected involvement. They were reminded that participation was voluntary and that they could withdraw at any point without penalty. McLeod (2011) stresses that informed consent requires researchers to provide adequate information about the study, ensure voluntariness, and maintain confidentiality.

To guarantee anonymity, the study avoided including identifying details on research instruments and stored all data securely. Hard-copy data was locked in cabinets, while electronic files were protected with passwords and access restrictions. The researcher also took steps to avoid both physical and emotional harm by ensuring privacy during data collection and avoiding intrusive questions. Finally, the study adhered to Moi University's research guidelines, and all sources used were cited and referenced appropriately. The next chapter presents data analysis, interpretation and discussion of the findings.

CHAPTER FOUR

DATA PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents the results, analysis and interpretation of the study findings. The chapter begins with the demographic data of the respondents. For learners with visual impairments, the demographic information includes age and class (Form), while for special needs teachers it covers age, academic and professional qualifications, and teaching experience. After the demographic profile, the chapter discusses the findings in relation to the study objectives and research questions. The researcher analyzed quantitative data using means, standard deviations, frequency tables, and simple linear regression while qualitative data was analyzed thematically.

4.1 Response Rate

The response rate reflects the proportion of participants who took part in the study compared to the total number invited. A higher response rate ensures that the sample accurately represents the target group, strengthening the study's reliability and validity. In this study, 38 out of 48 learner respondents completed the questionnaires, achieving a 79% response rate. This is well above the commonly accepted 70% threshold for survey research (Draugalis et al., 2008), making the data highly reliable for analysis.

4.2 Demographic Information of the Respondents

The study sought demographic information from learners and teachers who participated in this study. Learners were asked to indicate their class, type of visual impairment and age. On

the other hand, teachers were asked to indicate their age, qualification, training, and teaching experience. The demographic characteristics of the respondents were summarized below.

4.2.1 Learner Respondents

A total of 38 learners with visual impairments participated in the study from the selected integrated secondary schools in the South Rift Counties of Kenya. Their demographic characteristics were examined in terms of class level, age, and type of visual impairment. table 4.1 presents the results.

Table 4. 1 Demographic Characteristics of Learner Respondents

Category	Distribution	Frequency (n=38)	Percentage (%)
Class	Form Two	18	47.4
	Form Three	10	26.3
	Form Four	10	26.3
	Total	38	100
Age	Below 15 Years	18	47.4
	16 To 17 Years	10	26.3
	Above 17 Years	10	26.3
	Total	38	100
Type of Visual Impairment	Low Vision	22	57.9
	Totally Blind	16	42.1
	Total	38	100

The class distribution in table 4.1 shows that 18 learners (47.4%) were in Form Two, 10 (26.3%) in Form Three, and another 10 (26.3%) in Form Four. There were no Form One students included in the study, as all the secondary schools in Kenya, at the time of data collection did not have a Form One cohort due to the ongoing national transition from the 8-4-4 education system to the Competency-Based Education (CBE). Therefore, the study focused exclusively on the three upper status of the 8-4-4 system, ensuring a consistent academic background among respondents.

In terms of age, the data showed that 18 learners (47.4%) were below the age of 15, while 10 (26.3%) were aged between 16 and 17 years, and another 10 (26.3%) were above 17 years. This distribution aligns with the typical age range of learners in Status Two through Four and supports the study's aim of examining assistive technology use among adolescents at various stages of secondary education.

Regarding the type of visual impairment, 22 learners (57.9%) had low vision, while 16 learners (42.1%) were totally blind. Including both groups allowed the study to capture a broad spectrum of experiences and needs in the use of assistive technologies. Learners with low vision may benefit from visual enhancement tools like magnifiers and high-contrast displays, while those who are totally blind typically rely on tactile or auditory tools such as Braille devices and screen readers.

The demographic characteristics of the sample provide a useful foundation for interpreting the study's findings. The dominance of Form Two learners suggests that any interventions or insights gained could be particularly relevant to learners in the middle years of secondary school. Moreover, the relatively balanced representation between low vision and total blindness ensures that the study findings can inform support strategies across a range of visual impairments.

4.2.2 Special Need Teacher Respondents

The researcher recorded demographic details of the special needs teachers who participated in the interviews, including age, qualifications, training in visual impairment, and teaching experience. These factors are important for understanding how effectively assistive technologies can be integrated to support the academic performance of learners with visual impairment. The results are shown in Table 4.2.

Table 4. 2: Demographic Characteristics of the Special Needs Teachers

Category	Distribution	Frequency (n=5)	Percentage (%)
Age	31-39 years	1	20
	40-49 years	3	60
	50 years and above	1	20
	Total	**5**	**100**
Qualification	Diploma in SNE	1	20
	Degree (General)	0	0
	Degree in SNE	3	60
	Master's in SNE	1	20
	Total	**5**	**100**
Training on Visual Impairment	Received partial training	4	80
	No specialized training	1	20
	Total	**5**	**100**
Teaching Experience	Below 3 years	1	20
	4-9 years	1	20
	Above 10 years	3	60
	Total	**5**	**100**

The findings show that most teachers (60%) were between 40–49 years old. Another 20% were aged 31–39, and 20% were 50 and above. The concentration in the 40–49 age range suggests a workforce with solid teaching experience. However, the presence of older teachers nearing retirement highlights the need for planning around recruitment and succession.

In terms of qualifications, 60% of the teachers held a degree in Special Needs Education (SNE), 20% had a diploma in SNE, and another 20% had a Master's degree in the same field. None of the respondents held a general education degree, indicating that all had received some level of specialized training. This reflects a strong foundation of professionals equipped to support learners with special needs. That said, the small number with advanced qualifications points to a need for ongoing professional development.

Despite their formal qualifications, 80% of the teachers reported having only partial training specific to visual impairment. One teacher (20%) had no specialized training in this area. This gap raises concerns, as teaching learners with visual impairments requires specific skills, especially in using tools like Braille devices and screen readers. The lack of comprehensive training may limit how well assistive technologies are used in the classroom. Targeted capacity-building programs would help address this issue.

Regarding experience, 60% of the teachers had more than 10 years of teaching experience, 20% had 4–9 years, and another 20% had less than 3 years. This suggests a largely experienced teaching staff, which is likely to benefit the quality of instruction and support the use of assistive technologies. However, the presence of newer teachers points to the need for mentorship or induction programs to support their adjustment to specialized teaching.

The findings suggest that South Rift Counties has a relatively experienced and well-qualified group of special need teachers. However, there are notable gaps in specialized training for handling learners with visual impairment. While most teachers hold degrees in special education, their limited training in visual impairment may hinder the full integration of assistive technologies in the learning process. Additionally, the presence of older teachers nearing retirement necessitates proactive workforce planning to ensure continuity in special needs education.

4.3 Results as per the Analysis of the Specific Objectives

This section provides a review of the collected data with the analysis offering a comprehensive analysis of both quantitative and qualitative data. The section has been organized by the specific objectives followed by a detailed analysis.

4.3.1 Status of Assistive Technology in the School

The study sought to assess the availability and condition of assistive technologies used by learners with visual impairments in selected integrated secondary schools within the South Rift Counties of Kenya. Data were collected through an observation checklist, categorizing assistive technologies as either available or not available, and further classifying those available as either in good or poor condition. Table 4.3 present the findings.

Table 4. 3: Status of Assistive Technologies

Assistive Technology	Function	Availability	Condition
Screen Access Tools			
NVDA	Free screen reader that converts text to speech or Braille	Not Available	—
JAWS	Paid screen reader with advanced features	Available	Good
Generic Screen Readers	Reads screen content aloud or in Braille	Available	Good
Computer Screen Magnification	Enlarges digital screen content	Available	Poor
CCTV Magnification	Magnifies printed material onto a monitor via camera	Not Available	—
Reading and Writing Tools			
Braille Machines	Emboss Braille onto paper	Available	Good
Perkins Braille Machine	Manual Braille typewriter	Available	Good
Embosser	Electronic Braille printer	Available	Good
Thermoform	Duplicates Braille or tactile diagrams using heat	Available	Good
Braille Note Takers	Portable Braille input/output device	Available	Good
Victor Readers	Audio book players for DAISY/MP3 content	Available	Good
Large Print Texts	Printed materials in enlarged fonts	Available	Good
Keyboard Navigation Setup (Shortcuts/Labels)	Enable efficient, independent, and non-visual access to digital content	Not Available	—
Math and Science Tools			
Talking Calculators	Speaks numbers and functions for accessible arithmetic	Available	Good
Abacus	Tactile counting frame used in early math education	Available	Good
Braille Geometric Sets	Geometry tools with Braille/tactile markings	Available	Good
Spur Wheels	Draw tactile diagrams or lines on paper	Available	Good
Orientation and Time Tools			
Talking Watches	Announces time aloud	Available	Good
Talking Tablets	Tablets with built-in screen readers or accessible apps	Not Available	—
Audible Balls	Balls with bells or sound for safe physical activity	Available	Poor
Optical Aids			
Handheld Magnifiers	Portable magnification for reading or viewing small print	Available	Good
Hand Magnifier	Alternative term for handheld magnifier	Available	Poor

The results in table 4.3 revealed that most conventional assistive tools for learners with Visual Impairments were available and in good condition. For instance, Braille machines, Perkins Braillers, embossers, thermoforms, and large print texts were fully functional and widely

used in classrooms. This reflects a strong institutional commitment to supporting Braille literacy and tactile learning. One teacher emphasized the importance of these tools by stating:

> *"Braille machines are essential for our learners. We use them in almost every lesson, and we have ensured that all learners who need them have access."* (Teacher 3).

Another teacher added:

> *"Handheld magnifiers and large print texts have been very useful, especially for learners with low vision. They allow them to keep up with their peers in reading assignments."* (Teacher 1).

Digital tools such as generic screen readers and JAWS were also observed to be available and in good condition. However, the free screen reader NVDA was not available in any of the schools, and computer screen magnifiers were only available in poor condition. Despite these gaps, some schools had integrated training for learners on how to use digital accessibility tools. A teacher noted:

> *"We have trained learners to use screen magnifiers and NVDA. It has made a big difference in their ability to access online learning materials."* (Teacher 2).

These efforts demonstrate that teachers are actively working to incorporate digital literacy skills, although the infrastructure still poses limitations. While the presence of certain technologies such as JAWS and screen readers was noted, their limited number and the lack of sufficient software licenses hindered full access for all learners. This partial availability raised concerns about equity and effectiveness. One teacher commented:

> *"JAWS is a great tool, but we don't have enough licenses for all learners who need it. Some learners have to wait for their turn to access a computer with the software."* (Teacher 4).

This concern was echoed by one of the school principals, who acknowledged that:

> *"We are working on acquiring more screen reader licenses, but funding remains a challenge."* (Principal 1).

The findings also highlighted the availability and use of Braille Note Takers, which are essential for learners to take notes, complete assignments, and interact with digital content using Braille input. Although these devices were generally listed as available and in good condition, qualitative feedback revealed uneven access. While the devices were incorporated into teaching, their actual availability did not meet demand. One teacher explained:

> *"We teach learners how to use Braille Note Takers, but the challenge is that we do not have enough devices for everyone. Some learners have to rely on older models that are not always functional."* (Teacher 5).

The principal confirmed this constraint, stating:

> *"We acknowledge the importance of Braille Note Takers, but we have a challenge in acquiring more devices. Some learners are forced to share, which limits their efficiency in class."* (Principal 2).

Certain assistive technologies were notably absent. These included NVDA, keyboard navigation setups, CCTV magnification devices, and talking tablets. Their lack of availability points to existing gaps, particularly in digital and adaptive learning tools that could enhance accessibility further. Additionally, while audible balls were present for orientation and physical education purposes, their poor condition limited effective use.

The study findings show that while the schools have made considerable progress in providing core assistive technologies for learners with VI, especially in tactile and Braille-based tools, the availability and functionality of digital assistive devices remain inconsistent. The qualitative evidence from teachers and school principals' underscores both the successes in promoting accessibility and the ongoing challenges related to funding, device availability, and maintenance of assistive technologies hindering equitable access for learners with VI.

These findings are consistent with the observations made by Cherotich et al. (2024), who reported that learners with visual impairments in Kenyan schools face multiple challenges,

including insufficient Braille materials, lack of adaptive technology, limited digital skills, and infrastructural constraints. The current study reinforces these concerns, particularly regarding the limited availability of modern digital tools and the challenges schools face in acquiring and maintaining essential assistive technology.

Likewise, Fituma and Asmerom (2024) found that the development and use of Braille in schools is hindered by factors such as low availability of Braille devices, lack of teacher training, and a shift toward voice-based tools due to inadequate Braille resources. The South Rift Counties findings mirror these challenges. While tactile tools are widely used, the growing importance of digital Braille literacy is not being met with adequate resource allocation or technical capacity, potentially disadvantaging learners as more educational content moves online. The issue of limited digital access also points to broader equity concerns. If only a portion of learners have consistent access to tools like JAWS or Braille Note Takers, disparities in learning outcomes may grow, undermining the principle of inclusive education. The qualitative data reveal that learners often rely on shared devices or outdated models, which limits their ability to work independently, complete assignments on time, or engage fully in digital learning environments.

In summary, schools in the South Rift Counties have made commendable efforts to support learners with visual impairments, particularly through the provision of traditional tactile and Braille-based tools. These resources are widely available and in good condition, reflecting a strong commitment to inclusive education at the foundational level. However, there are still significant challenges in the provision and consistent use of digital assistive technologies. This could be attributed to limited funding, inadequate device availability, and poor

maintenance which continues to hinder full accessibility. Therefore, highlighting the need for targeted investment and policy support to bridge the digital gap in inclusive education.

4.3.2 Types of Assistive Technology Instructional Support Used

The study sought to determine the types of assistive technology (AT) instructional support available for learners with visual impairments in public secondary schools within Kenya's South Rift Counties. Quantitative data were gathered using a five-point Likert scale, and results were triangulated with insights from five teachers and two principals to offer a more comprehensive picture of how AT is implemented in everyday classroom practice the results are presented in table 4.4.

Table 4. 4: Types of Assistive Technologies Instructional Support Used

Item no.	Statement	Mean	Std. Deviation
1	In our school, there are many ATs instructional guides	3.342	0.669
2	In our school, we use video magnifier instructions for Learners	3.447	0.686
3	In our school, we use notetaker instructions for learners with visual impairment	3.395	0.595
4	In our school, we access audio books instructions for learners with visual impairment	3.29	0.732
5	We use navigating computer without a mouse instruction for learners with visual impairment	3.342	0.878
6	We use ATs instructional materials in every lesson in our school	3.237	0.786
	Grand Mean	**3.342**	**0.724**

The results in Table 4.4 showed that, availability of AT instructional guides recorded a mean score of 3.342 and a standard deviation of 0.669, indicating moderate agreement among learners regarding the presence of these materials in their schools. While this suggests a

general presence of instructional support, the variation in responses points to possible inconsistencies in accessibility or usage.

> *"Assistive technology instructional guides are available, and we do our best to integrate them into our teaching. However, some learners struggle to access them consistently, either due to limited copies or a lack of orientation."* (Teacher 3)

Instructions for using video magnifiers were reported with the highest mean score at 3.447 (SD = 0.686), reflecting widespread adoption and perceived usefulness among learners. These devices help learners with low vision magnify text or diagrams, enhancing their participation in classwork.

> *"Video magnifiers are among the most effective tools we use. Many learners rely on them daily to read text more clearly, and they have greatly improved their ability to participate in class activities."* (Teacher 1)

Notetakers had a similarly high mean score of 3.395 (SD = 0.595), suggesting consistent use and strong agreement among respondents. Notetakers are typically used by learners to document lessons independently, improving their engagement and retention of content.

> *"Learners appreciate how notetakers help them keep track of their work. For us teachers, they are very useful in making sure learners are able to follow through the lesson and organize their notes."* (Teacher 4)

The use of audiobooks scored slightly lower with a mean of 3.290 and standard deviation of 0.732. This reflects moderate but less uniform application, likely influenced by learner preferences and resource availability.

> *"Audiobooks are useful, but not every learner prefers them. Some like reading Braille or using magnifiers instead. We try to provide variety, but resources are still limited."* (Teacher 2)

Computer navigation without a mouse received a mean of 3.342 and a relatively high standard deviation of 0.878, indicating a wide spread in learner experience and comfort levels. This disparity points to varying levels of exposure, training, and resource adequacy.

> *"Some of the students have picked it up well, but others really struggle. It's not something they are exposed to early, and we don't have enough time in the timetable for proper ICT support."* (Teacher 5)

> *"Computer skills are a challenge because the ratio of devices to students is low, and not all teachers are confident using AT themselves. This slows down adoption and consistency."* (Principal 3)

The least frequently used support was the integration of AT materials in every lesson, with a mean of 3.237 and the highest standard deviation of 0.786. This suggests irregularity in how consistently AT tools are incorporated across subjects and by different teachers.

> *"We do our best to integrate assistive technology into our teaching, but consistency is still an issue. The availability of resources and learners' familiarity with them significantly affect their usage in lessons."* (Teacher 1)

> *"We encourage teachers to use AT across subjects, but sometimes the materials are not compatible, or the teacher doesn't feel confident enough. So, it is not yet embedded in every classroom."* (Principal 2)

The overall grand mean of 3.342 (SD = 0.724) indicates a moderate level of integration of assistive technology instructional support in schools across the South Rift Counties. While tools such as video magnifiers and notetakers are widely adopted and considered effective, the application of other supports, such as audiobooks, computer navigation training, and consistent integration of AT into every lesson, remains uneven. The qualitative feedback from teachers and principals cited resource limitations, teacher capacity, and variation in student needs as barriers to consistent and effective use of AT in the classrooms.

These results concur with findings by Vincent et al. (2024), who observed that while AT tools are becoming more available in schools, their use is hindered by inadequate teacher training, lack of technical support, and limited device availability. Similarly, Tony (2019) emphasized the need for robust professional development and targeted investments to build teacher confidence and consistency in using AT in instructional planning

In conclusion, the findings from the South Rift Counties reveal that while schools have made meaningful efforts to incorporate various assistive technology instructional supports, their application remains uneven. Tools such as video magnifiers and notetakers are among the most consistently used and well-integrated into daily teaching, showing that both learners and teachers find them effective. However, the use of audiobooks, keyboard navigation skills, and AT materials across all lessons shows notable inconsistencies, often due to limited resources, insufficient training, and varying levels of learner familiarity. These gaps highlight the need for a more structured and equitable approach to integrating AT instructional support in classrooms, with emphasis on regular training for teachers, improved access to devices, and consistent use of assistive tools across subjects to ensure all learners with visual impairments benefit equally.

4.3.3 Level of Learner Involvement in the Use of Assistive Technologies

This section presents findings on the extent to which learners with visual impairments in the South Rift Counties are involved in the use of Assistive Technologies (ATs) within their learning environments. The focus was on six key aspects: access, participation, collaboration, teacher support, independence, and motivation. Data were gathered using a Likert-scale questionnaire where learners rated their responses on a five-point scale. The results are presented in Table 4.5

Table 4. 5 Learner Involvement in the Use of Assistive Technologies

Item no	Statement	Strongly Agree F (%)	Agree F (%)	Neutral F (%)	Disagree F (%)	Strongly Disagree F (%)	Total F (%)
1	As learner I am allowed to use ATs in the school	7(18.4%)	21(55.3%)	4(10.5%)	4(10.5%)	2(5.3%)	38(100%)
2	As learner I actively participate in lessons which ATs are used	9(23.7%)	24(63.2%)	3(7.9%)	1(2.6%)	1(2.6%)	38(100%)
3	I always collaborate with other learners while using ATs	9(23.7%)	25(65.8%)	2(5.3%)	2(5.3%)	0(0%)	38(100%)
4	Our teachers often customize ATs to suit my learning needs	10(26.3%)	18(47.4%)	5(13.2%)	2(5.3%)	3(7.9%)	38(100%)
5	Our teachers give us a chance to independently interact with ATs	11(28.9%)	19(50.5%)	6(15.8%)	2(5.3%)	0(0%)	38(100%)
6	ATs motivates me to learn and innovate	8(21.1%)	22(57.96%)	5(13.2%)	1(2.6%)	2(5.3%)	38(100%)

The results in table 4.5 indicate that most learners are allowed to use ATs in school, with 21 (55.3%) agreeing and 7 (18.4%) strongly agreeing. However, 6 (15.8%) disagreed or strongly disagreed, and 4 (10.5%) were neutral. These results point to generally good access, though some learners may face restrictions due to limited resources or administrative issues. A teacher noted:

> *"Although ATs are available, not all learners can access them when they need to. Sometimes, there are restrictions due to limited resources or administrative concerns."* (Teacher 3)

Learner participation in lessons using ATs was notably high. A combined 33 (86.9%) learners agreed or strongly agreed that they participate actively in such lessons, with only 2 (5.2%) disagreeing and 3 (7.9%) neutral. This suggests that ATs positively influence engagement and inclusivity in classroom activities. As one teacher observed:

> *"Learners who use ATs tend to be more engaged. They follow lessons, contribute to discussions, and help each other when necessary."* (Teacher 1)

Peer collaboration was also strong, with 25 (65.8%) agreeing and 9 (23.7%) strongly agreeing that they collaborate with others while using ATs. Only 2 (5.3%) disagreed, and none strongly disagreed. This pattern suggests that ATs encourage peer interaction and shared problem-solving. A teacher remarked:

> *"I've observed that learners using ATs tend to work together more. They share tips and even troubleshoot issues collectively."* (Teacher 5)

Regarding teacher support, 18 (47.4%) learners agreed and 10 (26.3%) strongly agreed that teachers customize ATs to meet their needs. However, 5 (13.2%) were neutral, and 5 (13.2%) disagreed or strongly disagreed. These mixed results indicate that while many teachers offer personalized support, this is not uniform across schools. A teacher explained:

> *"We try to adjust ATs to fit students' needs, but it's not always possible due to lack of training or access to specialized tools."* (Teacher 2)

In terms of learner independence, 19 (50.0%) agreed and 11 (28.9%) strongly agreed that they are given opportunities to interact with ATs independently. Still, 6 (15.8%) were neutral and 2 (5.3%) disagreed, suggesting that autonomy is encouraged but not fully realized for all students. One teacher shared:

> *"Some learners are very independent in using ATs, but others need support. Striking that balance is important."* (Teacher 4)

On motivation, 22 (57.9%) agreed and 8 (21.1%) strongly agreed that ATs inspire them to learn and innovate. However, 5 (13.2%) were neutral, and 3 (7.9%) disagreed or strongly disagreed. These results imply that ATs are a positive influence for most learners, but some may need more support or engagement strategies to fully benefit. A teacher noted:

> *"Assistive technologies boost confidence, but some learners need extra encouragement to make full use of them."* (Teacher 3)

The findings indicate that most learners in South Rift Counties are actively using assistive technologies (ATs), particularly in lesson participation 33 (86.9%) and peer collaboration 34 (89.5%). These tools appear to support engagement, interaction, and motivation. However, not all learners received personalized support, with some struggling due to limited access to devices or a lack of guidance from teachers. For instance, 6 (15.8%) learners disagreed or strongly disagreed that they had equitable access to ATs, and 6 (15.8%) also reported a lack of teacher customization of these tools. Additionally, 8 (21.1%) were either neutral or disagreed when asked about their autonomy in using ATs. These areas require further attention and improvement.

These findings are consistent with those of Juma and Ntulo (2024), who reported similar issues in primary schools in Zanzibar. While schools had access to tools such as hearing aids, Braille, and speech recognition software, learners still struggled with effective use. Like the current study, this highlights that access alone is not enough. Effective integration of ATs requires teacher training, consistent support, and learner-centered approaches to ensure inclusive and meaningful use.

The findings from this section suggest that most visually impaired learners in the South Rift Counties are meaningfully engaged in the use of Assistive Technologies (ATs), particularly in areas related to lesson participation and peer collaboration. High levels of agreement on statements related to active involvement in class activities and group work indicate that ATs have the potential to promote an inclusive and interactive learning environment. When learners are supported in using these tools, they not only follow lessons more effectively but also help one another, which can strengthen their social and communication skills.

However, the data also reveal areas that need attention. A notable number of learners either disagreed or were neutral when asked whether they had regular access to ATs or whether teachers customized the tools to fit individual learning needs. This points to potential issues in the distribution of resources and the capacity of teachers to adapt ATs for diverse learners. Limited access or generic implementation can reduce the effectiveness of these tools and may contribute to disparities in learner outcomes.

The results also show that while many learners are given opportunities to use ATs independently, some may still require more support or freedom in this regard. Encouraging autonomy in AT use is important, as it builds confidence and promotes self-directed learning. Similarly, while ATs appear to enhance learner motivation for the majority, there is still a segment of the population that does not feel fully inspired by their use, possibly due to a lack of training, personalization, or variety in the types of ATs provided.

These findings imply that while ATs are playing a valuable role in supporting learners with visual impairments, their full potential is not yet being realized across the selected schools in South Rift Counties. Therefore, improvements in teacher training, resource allocation, and school-level policies on AT use are necessary to address the gaps identified. With more consistent support and a focus on learner-centered use of ATs, schools in the region can enhance inclusion and ensure that all learners benefit equitably from the technologies available to them.

4.3.4 Integration of Assistive Technology on learners' Academic Performance

The final objective sought to examine the influence of assistive technology (AT) integration on academic performance. The study conceptualized the level of learner involvement in ATs

as the independent variable because effective AT utilization depends on learners' active engagement rather than mere availability. Learner involvement in AT use captured key aspects of AT integration in learning, such as participation, collaboration, autonomy, and engagement, which were aggregated into a composite mean score for analysis. By focusing on learner involvement, the study examines whether the quality and depth of AT engagement significantly influence academic performance. On the other hand, academic performance, as the dependent variable, was conceptualized in terms of learners' previous aggregate mean score obtained in the preceding academic year. This provided an objective measure of performance that could be statistically analyzed.

To test the null hypothesis **(H_0)** that integration of assistive technologies has no statistically significant influence on academic performance, a simple linear regression analysis was conducted.

The model summary (table 4.6) shows that, the regression analysis yielded an R value of .699, indicating a strong positive correlation between learner involvement in AT use and academic performance. The coefficient of determination, $R^2 = .489$, means that 48.9% of the variance in academic performance is explained by the level of learner involvement in AT use. The adjusted $R^2 = .475$ suggests the model retains substantial explanatory power after adjusting for sampling bias. The overall model was statistically significant ($p < .001$), confirming its suitability for prediction.

Table 4. 6 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig. F Change
1	.699[a]	0.489	0.475	0.54327	.000

a Predictors: (Constant), Learner Involvement in ATs Use
b Dependent Variable: Academic Performance

The analysis of variance (ANOVA) in Table 4.7 further confirmed the model's statistical significance, F (1, 36) = 34.474, p < .001, indicating that learner involvement in AT use significantly predicts academic performance.

Table 4. 7 Model Fit

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.175	1	10.175	34.474	.000[b]
	Residual	10.625	36	0.295		
	Total	20.80	37			

a Dependent Variable: Academic Performance
b Predictors: (Constant), Learner Involvement in ATs Use

The regression coefficients in Table 4.8 show that the unstandardized coefficient for learner involvement in AT use was B = 0.537 ($p < .001$), while the standardized beta (β) was .699. This indicates a strong, statistically significant positive relationship between the predictor and outcome variables.

Table 4. 8 Regression Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**		
		B	**Std. Error**	**Beta (β)**	**t**	**Sig.**
1	(Constant)	1.823	0.348		5.237	.000
	Learner Involvement in ATs Use	0.537	0.091	0.699	5.871	.000

a Dependent Variable: Academic Performance

The results indicate that learner involvement in assistive technology use significantly and positively predicts academic performance, **$\beta = .699$, $p < .001$.** This means that a one standard deviation increase in learner involvement is associated with a 0.699 standard deviation increase in academic performance. Given that $p < .05$, the null hypothesis is rejected. Therefore, the integration of assistive technologies, when it actively involves learners, has a statistically significant and positive influence on their academic achievement.

These findings underscore the value of not just providing assistive technologies, but ensuring they are meaningfully integrated into classroom learning through learner-centered practices. Active involvement; such as participation in lessons, collaboration with peers, and independent interaction with AT, emerges as a strong predictor of academic success. The results align with studies by Edyburn (2024) and Okolo and Bouck (2019), who noted that assistive technologies enhance learner engagement, autonomy, and achievement. Murithi et al. (2022) similarly found a significant positive relationship between use of listening assistive devices and academic performance in Kenya. These findings reinforce the idea that ATs, when well-integrated and actively used, support inclusive and effective learning environments.

The findings of the study underscore the critical role that learner involvement in assistive technology (AT) use plays in shaping academic performance. The results indicate that 48.9% of the variance in academic performance can be attributed to the extent to which learners engage with ATs. This suggests that the effectiveness of AT integration in education is not merely a function of access to devices, but rather depends on how actively and meaningfully learners utilize these tools within the learning process.

Learners who participate actively in lessons, collaborate with peers, and exercise autonomy in using ATs demonstrate stronger academic outcomes. The significant positive beta coefficient ($\beta = .699$) confirms that increased learner engagement with ATs is associated with corresponding improvements in academic achievement. This relationship highlights that assistive technologies, when used effectively, enhance learners' access to content, promote interaction, and support the development of critical thinking and problem-solving skills.

For learners with visual impairments, the implication is that ATs serve not only as accommodations but as essential tools that can elevate educational attainment. Therefore, schools should move beyond basic provision of these technologies and invest in strategies that encourage consistent, learner-centered use. This includes teacher training, individualized support, and the creation of learning environments that promote independence and collaboration. Enhancing the quality of learner engagement with ATs is thus pivotal to improving academic performance and ensuring equitable learning outcomes for all learners.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This study examined the effect of integrating Assistive Technologies on academic performance for learners with visual impairment in selected integrated secondary schools in South Rift Counties, Kenya. The study objectives were: to assess Status of AT used, determine the types AT instructional support used, to investigate the level of learner involvement in the use of ATs, and to examine the influence of integration of ATs on academic performance for learners with visual impairment. This chapter presents summary of the findings, conclusions, recommendations, and suggestions for further research.

5.1 Summary of The Findings

The findings of this study are summarized below as per the study objectives:

5.1.1 Status of Assistive Technologies Used

The study found that the selected schools in the South Rift Counties have made notable efforts to provide essential assistive technologies for learners with visual impairments. Conventional tools, such as Braille machines, Perkins Braillers, embossers, thermoforms, and large print texts, were widely available and generally in good working condition. These tactile and print-based devices were used consistently in classroom settings and supported literacy, note-taking, and participation in learning activities. Basic math and science tools, including abacuses and Braille geometric sets, were also present and functional. Orientation tools, including talking watches and audible balls, were provided; however, some, such as the audible balls, were in poor condition, which limited their effectiveness.

Despite these strengths, the findings also revealed significant gaps in the availability and functionality of digital assistive technologies. Although some schools had screen readers like JAWS, limited licensing and hardware availability restricted equitable access among learners. Other key tools, such as NVDA, CCTV magnifiers, talking tablets, and keyboard navigation setups, were either unavailable or not in usable condition. Braille Note Takers, while present, were insufficient in quantity, which meant that learners often had to share devices or rely on outdated models. These limitations hindered learners' ability to fully engage in digital learning environments and highlighted persistent challenges related to funding, infrastructure, and maintenance. While foundational assistive technologies are adequately provided, there is a clear need to strengthen the digital component of assistive technology provision to support inclusive and equitable learning to enhance academic performance for learners with VI.

5.1.2 Types of Assistive Technology Instructional Support Used

The study found that schools in the South Rift Counties have made moderate progress in integrating assistive technology (AT) instructional support for learners with visual impairments. Tools such as video magnifiers and notetakers were among the most frequently used, with relatively high levels of agreement on their effectiveness and accessibility. Video magnifiers, in particular, were recognized for helping learners with low vision participate more actively in classroom activities, while notetakers supported independent learning and lesson organization. The presence of AT instructional guides and training on navigating computers without a mouse was also noted, although responses indicated inconsistencies in availability and learner proficiency. Audiobooks were moderately used, though learner preferences and resource availability appeared to influence their adoption. The data

suggested that while learners benefited from these supports, their access and use remained dependent on a combination of resource availability, exposure, and teacher capacity.

However, the integration of assistive technology into daily instruction across all subjects was found to be irregular. Despite a clear intent to embed AT within classroom routines, schools faced challenges related to uneven distribution of materials, insufficient devices, and varied teacher preparedness. Some teachers reported difficulty incorporating AT tools consistently due to incompatibility with subject content or lack of confidence in using the technology. As a result, the overall application of AT instructional support was neither uniform nor fully embedded in school practices. These findings point to the need for improved teacher training, structured implementation strategies, and better resource allocation to ensure equitable and consistent use of assistive technology. Therefore, addressing these areas would enhance the learning experience and academic performance for learners with visual impairments.

5.1.3 Level of Learner Involvement in the Use of Assistive Technologies

The study findings showed that learners with visual impairments in the selected schools in South Rift Counties are generally well engaged in the use of assistive technologies within their schools. Most learners reported being allowed to use assistive tools, participating actively in lessons where these tools are employed, and collaborating with peers during their use. This level of involvement suggests that assistive technologies are contributing positively to classroom engagement, peer interaction, and motivation. Learners also acknowledged opportunities for independent use of assistive devices, which supports the development of autonomy and confidence in navigating learning tasks. The tools appear to be well-integrated into daily classroom routines, promoting both inclusion and active learner participation.

Despite these positive trends, some areas require further attention. A number of learners expressed uncertainty or dissatisfaction regarding access to assistive technologies and the extent to which teachers tailor these tools to meet individual learning needs. This points to ongoing challenges in resource availability, equitable distribution, and teacher capacity to customize support. Additionally, while many learners felt motivated by the use of assistive technologies, a smaller proportion remained neutral or unmotivated, suggesting a need for more personalized or varied approaches. These results highlight the importance of strengthening teacher training, improving device availability, and refining strategies that promote consistent and meaningful use of assistive technologies across schools.

5.1.4 Integration of Assistive Technology on Learners' Academic Performance

The study revealed that there is a strong positive relationship between integration of Assistive Technology (AT) in teaching and learning and learners' academic performance. The coefficient of determination (R^2) was 0.489, indicating that 48.9 percent of the variance in academic performance could be explained by how actively learners engaged with AT. The model was statistically significant, with a standardized beta coefficient ($\beta=0.699$, $p<0.05$), confirming that higher levels of learner involvement in the use ATs significantly predicted better academic outcomes.

These results underscore the importance of not just providing assistive technologies but ensuring they are integrated into classroom instruction in ways that support active learner participation. Learners who are more engaged with ATs tend to achieve stronger academic results, suggesting that these tools function as more than just accommodations. They act as enablers of meaningful learning when used effectively. The significant beta value reflects the

strength of this association. Therefore, to improve academic achievement and promote equity, schools should prioritize instructional strategies and support systems that encourage consistent, learner-centered use of assistive technologies. This includes teacher preparation, individualized support, and classroom environments that promote independence, interaction, and the effective use of available tools.

5.2 Conclusion

The study concludes that while schools in the South Rift Counties have provided a solid foundation in traditional assistive technologies for learners with visual impairments, notable gaps remain in digital accessibility. Tools such as Braille machines, embossers, and geometric sets are widely available and functional, which supports tactile learning and academic engagement. However, the inconsistent availability of modern digital tools, such as screen readers, Braille Note Takers, and magnification software, continues to limit full participation in digital learning. These disparities point to broader systemic issues related to funding, maintenance, and infrastructural support, highlighting the need for targeted investment to improve digital inclusion and support equitable educational outcomes.

In terms of instructional support, the integration of assistive technology remains partial and inconsistent across subjects and classrooms. While devices like video magnifiers and notetakers are viewed positively and are used to some extent, their effectiveness is constrained by uneven distribution, varying levels of teacher readiness, and limited access to instructional materials. Teachers face difficulties in embedding assistive technologies into all areas of instruction, which affects how consistently learners benefit from them. Strengthening teacher training, ensuring a structured approach to technology integration, and

improving access to instructional tools are essential to optimize learning and improve academic performance for learners with visual impairments.

Learners in the study were found to be generally active participants in the use of assistive technologies. Their involvement included regular classroom use, peer interaction, and growing independence, all of which suggest that assistive technologies are playing a positive role in promoting inclusion and learner engagement. However, challenges persist in terms of equitable access, personalized support, and the degree to which teachers adapt tools to individual learner needs. To maintain and expand learner involvement, schools should improve device availability, support differentiated instruction, and enhance teachers' capacity to integrate assistive tools effectively into everyday learning experiences.

Finally, the study established a significant and positive relationship between the integration of assistive technologies and academic performance. Higher levels of learner engagement with assistive tools were associated with better academic outcomes, confirming that assistive technologies contribute directly to learning success when used actively and meaningfully. This finding underscores the importance of not only providing assistive technologies but embedding them into instructional practice in a way that encourages learner autonomy, interaction, and sustained use. To improve academic outcomes for learners with visual impairments, educational stakeholders must invest in capacity building, resource provision, and inclusive pedagogical strategies that support the ongoing and effective use of assistive technologies in all learning environments.

5.3 Recommendations

The study makes the following recommendations:

i. **Provision and Maintenance of Digital Assistive Technologies:** The Ministry of Education (MoE), in collaboration with the Kenya Institute of Special Education (KISE) and the National Council for Persons with Disabilities (NCPWD), should prioritize investment in up-to-date digital assistive technologies such as screen readers (JAWS, NVDA), Braille Note Takers, and magnification devices. These tools should be made available in adequate numbers and maintained regularly, with priority given to subjects where access gaps are greatest, including mathematics and sciences.

ii. **Strengthening Teacher Training and Professional Development:** The Teachers Service Commission (TSC), working with KISE and MoE, should establish regular, subject-specific Continuous Professional Development (CPD) programs on the integration of assistive technologies. Training should go beyond general awareness and equip teachers with practical, classroom-level strategies for embedding AT into lesson delivery and supporting individualized learning needs.

iii. **Ensuring Equitable and Learner-Centered Use of Assistive Tools:** School Boards of Management (BoMs), guided by MoE and NCPWD, should adopt clear protocols to guarantee equitable distribution and learner-centered use of AT. This includes structured peer mentoring, access to devices both during and beyond lessons, and guidance that encourages learners with visual impairment to use AT confidently and independently.

iv. **Embedding Inclusive Practices into Curriculum and Instruction:** The Kenya Institute of Curriculum Development (KICD), in coordination with TSC and MoE, should align curriculum content and instructional materials with the needs of learners using assistive technologies. Inclusive pedagogical practices must be systematically embedded into teaching frameworks, with monitoring and evaluation mechanisms to

measure how effectively AT use supports learner participation and academic outcomes.

5.4 Suggested Areas of Further Research

This study examined the influence of integration of assistive technologies (ATs) on academic performance for learners with visual impairment in selected schools in South Rift Counties. While it provided useful insights, several areas warrant further investigation:

i. A Comparative study the availability of ATs in different special schools, mainstream inclusive schools, and tertiary institutions to identify disparities and best practices for enhancing access and utilization.
ii. A study examining the impact of integration of ATs on academic performance of learners with other disabilities to develop a broader understanding of the effect of integration of ATs on academic performance for learners with special needs.
iii. A study investigating external factors such as parental involvement, community support, and self-efficacy to understand how they influence learners' ability and willingness to use ATs effectively.

REFERENCES

Abner, G. H., & Lahm, E. A. (2002). Implementation of assistive technology with students who are visually impaired: Teachers' readiness. *Journal of Visual Impairment & Blindness, 96*(2), 98-105. https://doi.org/10.1177/0145482X0209600204

AFB. (2015). *Through Texas School for Visually Impaired and Perkins School for the Blind*.

Ahmed, I., & Ishtiaq, S. (2021). Reliability and validity: Importance in medical research. *Methods, 12*(1), 2401-2406.

Al-Azawei, A., Serenelli, F., & Lundqvist, K. (2016). Universal Design for Learning (UDL): A content analysis of peer reviewed journals from 2012 to 2015. *Journal of the Scholarship of Teaching and Learning*, *16*(3), 39-56. https://doi.org/10.14434/josotl.v16i3.19295

Allemang, B., Sitter, K., & Dimitropoulos, G. (2022). Pragmatism as a paradigm for patient-oriented research. *Health Expectations, 25*(1), 38-47.

Alves, C. C. F., Monterio, G. B. M., Robello, S., Gasparetto, M. E. R. F., & Carvalho, M. (2019). Assistive technology applied to education of learners with visual impairment. *Rev. Panam Salud Publica*, Carpinas University, Brazil.

Amineh, R. J., & Asl, H. D. (2015). Review of constructivism and social constructivism. *Journal of Social Sciences, Literature and Languages, 1*(1), 9-16.

Angrosino, M. (2007). *Doing Ethnographic and Observational Research.* SAGE Publications.

Anney, V. N. (2014). Ensuring the Quality of the Findings of Qualitative Research: Looking at Trustworthiness Criteria. *Scholarlink research journal*, 272-281.

Anstey, M., & Bull, G. (2006). *Teaching and learning multiliteracies: Changing times, changing literacies*. International Reading Association.

Barnes, C., & Mercer, G. (2010). *Exploring disability* (2nd ed.). Polity Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 5771). Washington, DC: American Psychological Association.

Chege, A. K., Kimutai, B. C., & Orodho, J. A. (2019). Impact of assistive technology on performance of learners with special needs in selected special secondary schools in Kenya. *International Journal of Education and Research*, *7*(5), 57–70.

Chege, M. W., Chomba, J. M., & Awori, B. B. (2019). Assistive technology on teaching mathematics to learners with visual impairments in special primary schools in Kenya.

Cherotich, C., Cheptoo, K. P., & Obare, R. M. (2024). Challenges in accessing digital resources among visually impaired (VI) students at the University of Nairobi Library. *Information Development*. https://doi.org/10.1177/02666669241259083

Cheung, A. K. L. (2021). Structured questionnaires. In *Encyclopedia of quality of life and well-being research* (pp. 1-3). Springer International Publishing.

Cobley, D. S. (2012). *Towards economic empowerment for disabled people: Exploring the boundaries of the social model of disability in Kenya and India* (Doctoral dissertation, University of Birmingham).

Cohen, L., Manion, L., & Morrison, K. (2017). Validity and reliability. In *Research methods in education* (pp. 245-284). Routledge.

Creswell, J. W. (2012). Qualitative inquiry & research design: Choosing among five approaches (4th ed.). Thousand Oaks, CA: Sage

Creswell, J. W. (2018). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). Merrill/Prentice Hall.

Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). SAGE Publications.

Cullen, D. (2016). JAWS and dolphins for Nairobi's blind learners. *The Register*.

Davidavičienė, V. (2018). Research methodology: An introduction. In *Modernizing the academic teaching and research environment: Methodologies and cases in business research* (pp. 1-23).

de Verdier, K. (2016). Inclusion in and out of the classroom: A longitudinal study of students with visual impairments in inclusive education. *British Journal of Visual Impairment, 34*(2), 130-140. https://doi.org/10.1177/0264619615625428

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. D.C. Heath and Company.

Dewey, J. (1986). Experience and education. *The Educational Forum, 50*(3), 241–252. Taylor & Francis Group.

Dhaygude, M. A., & Waghmare, A. (2019). Impact of assistive technology on academic performance of visually challenged students. *International Journal of Academic Research and Development, 4*(2), 1–3.

Dhaygude, R., & Waghmare, S. K. (2019). Innovative solutions for visual impairment: Design and implementation of a real-time assistance system. *Journal of Data Acquisition and Processing, 38*(3), 3188.

Ebuenyi, I. D., Kafumba, J., Smith, E. M., Jamali-Phiri, M. Z., Munthali, A., & MacLachlan, M. (2023). Empirical research and available data on assistive technology for persons with disabilities in Malawi: A review. *Assistive Technology*, *35*(1), 94-106.

Edyburn, D. (2024). Rethinking assistive technology research and the evidencing of assistive technology outcomes. In *A Research Agenda for Disability and Technology* (pp. 147-166). Edward Elgar Publishing.

Finetti, J., & Luongo, N. (2023). Barriers to assistive technology integration in U.S. schools: A teacher perspective. *Journal of Visual Impairment & Blindness, 117*(2), 145–158. https://doi.org/10.1177/0145482X23116372

Finetti, M., & Luongo, N. (2023). Assistive technology for blindness and visual impairments: Supporting teachers in K-12 classrooms. In *Using Assistive Technology for Inclusive Learning in K-12 Classrooms* (pp. 74-103). IGI Global.

Flaxman, S. R., Bourne, R. R., Resnikoff, S., Ackland, P., Braithwaite, T., Cicinelli, M. V., ... & Zheng, Y. (2017). Global causes of blindness and distance vision impairment 1990–2020: A systematic review and meta-analysis. *The Lancet Global Health*, *5*(12), e1221-e1234.

Fosnot, C. T. (Ed.). (2013). *Constructivism: Theory, perspectives, and practice* (2nd ed.). Teachers College Press.

Fraenkel, J. R., & Wallen, N. E. (2009). *How to design and evaluate research in education* (7th ed.). McGraw-Hill.

Gawande, A. (2009). *The Checklist Manifesto: How to Get Things Right.* Metropolitan Books.

Ghai, A. (2002). Disability in the Indian context: Post-colonial perspectives. *Disability/postmodernity: Embodying disability theory*, 88-100.

Groenewegen, M. (2016). Educational achievement of deaf and hard-of-hearing learners: A comparative study of early visual impairment users. *Journal of Deaf Studies and Deaf Education*, *21*(3), 215–229. https://doi.org/10.1093/deafed/enw017

Groenewegen, T. G. (2016). Visually handicapped learners learning from sighted teachers: A conceptual framework for researchers into special instructional technology. *African Journal of Education.* Kenyatta University.

Guanoluisa, F. S. C., Claudio, L. J. P., Cevallos, D. V. B., Colcha, C. D. P., Taipe, S. L. C., & Pilatasig, G. M. G. (2022). Visually Impaired Students' and Their Teacher's Perceptions of the English Teaching and Learning Process. *MEXTESOL Journal*, *46*(4), n4.

Hafsa, N. E. (2019). Mixed methods research: An overview for beginner researchers. *Journal of Literature, Languages and Linguistics*, *58*(1), 45-48.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Hasselbring, T. S., & Glaser, C. W. (2012). Use of computer to help learners with special needs.

Hopwood, C. J., Bleidorn, W., & Wright, A. G. (2022). Connecting theory to methods in longitudinal research. *Perspectives on Psychological Science, 17*(3), 884-894.

Hosking, D. L. (2008). Critical disability theory. A paper presented at the 4th biennial disability studies conference at Lancaster University, UK, Sept. 2-4, 2008. *Journal of Consulting and Clinical Psychology*, *72*(3), 467-478.

Iba, T., & Burgoyne, A. (2019, July). Pattern language and the future of education in light of constructivist learning theories, part 2: The social constructivism of Lev Vygotsky. In *Proceedings of the 24th European Conference on Pattern Languages of Programs* (pp. 1-11).

ICEVI. (2009). International Council for Education of People with Visual Impairment: The Braille Code: Past, Present, Future.

Jackson, R. M. (2009). *Technologies supplying curriculum access for learners with disabilities*. NCAC.

Jarbi, Y.A (2024). *Influence of Assistive Technologies on Visually Impaired Students' Experiences of Social Inclusion in Higher Education in Qatar* (Doctoral dissertation, University of Leicester).

Johnstone, C., Altman, J., Timmons, J., Thurlow, M., & Laitusis, C. (2009). Field-based perspectives on technology-assisted reading assessments: Results of an interview study with teachers of learners with visual impairments. *Phaetons*, NJ: Education Testing Service.

Jonassen, D., Howland, J., Marra, R. M., & Crismond, D. (2008). *Meaningful learning with technology* (3rd ed.). Pearson.

Juma, R. K., & Ntulo, G. R. (2024). The Availability and Use of Assistive Technologies among Pupils with Hearing and Visual Impairments in Zanzibar. *International Journal of Education and Development using Information and Communication Technology*, *20*(1), 63-77.

Kana, F. Y., & Hagos, A. T. (2024). Factors hindering the use of Braille for instruction and assessment of students with visual impairments: A systematic review. *British Journal of Visual Impairment*. https://doi.org/10.1177/02646196241239173

Karchmer, R. A., Mallette, M. H., Karasoteriou, J., & Leu, D. J. (Eds.). (2005). *Innovative approaches to literacy education: Using the internet to support new literacies*. International Reading Association.

Kasomo, D. (2006). *Research methods in humanities and education*. Egerton University Press.

Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications for social work research. *Social Sciences, 8*(9), 255. https://doi.org/10.3390/socsci8090255

Kavagi, L. (2010). *Computer in schools: Strategies for successful planning and implementation of computer projects*. The Jomo Kenyatta Foundation.

Kelly, L. M., & Cordeiro, M. (2020). Three principles of pragmatism for research on organizational processes. *Methodological Innovations, 13*(2), 2059799120937242. https://doi.org/10.1177/2059799120937242

Kelly, S. M. (2009). Use of assistive technology by learners with visual impairments: Findings from a national survey. *Journal of Visual Impairment & Blindness, 103*(8), 470-480. https://doi.org/10.1177/0145482X0910300803

Kelly, S. M., & Smith, D. W. (2011). The impact of assistive technology on the educational performance of students with visual impairments: A synthesis of the research. *Journal of Visual Impairment & Blindness, 105*(2), 73-83. https://doi.org/10.1177/0145482X1110500202

Kenya Society for the Blind. (2021). *Annual report and financials*. Retrieved May 13, 2024, from http://www.ksblinb.org

Kieti, M. (2018). Highlights on the work of the Kenyan Union of the Blind in assistive technology and inclusive education. *Kenya Union of the Blind*.

Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education, 6*(5), 26-41. https://doi.org/10.5430/ijhe.v6n5p26

Koh, T. S., & Lee, S. C. (2018). Information communication technology in education: Singapore's ICT Masterplan 2007-2018. *Ministry of Education, Singapore*.

Kombo, D. K., & Tromp, D. L. A. (2006). *An introduction to proposal and thesis writing*.

Kothari, C. R. (2010). *Research methodology: Methods and techniques* (2nd ed.). New Age International Ltd.

Krejcie, R. V., & Morgan, D. W. (1970). *Determining sample size for research activities*. Educational and Psychological Measurement, 30(3), 607–610. https://doi.org/10.1177/001316447003000308

Lang, R. (2009). The United Nations Convention on the right and dignities for persons with disability: A panacea for ending disability discrimination?. *Alter, 3*(3), 266-285. https://doi.org/10.1016/j.alter.2009.04.001

Lazarus, K., & Mbithe, D. (2018). Influence of assistive technology on cognitive development of learners with special needs in Makueni County, Kenya. *European Journal of Education Studies, 4*(12), 201–213. https://doi.org/10.5281/zenodo.2551949

Maarouf, H. (2019). Pragmatism as a supportive paradigm for the mixed research approach: Conceptualizing the ontological, epistemological, and axiological stances of

pragmatism. *International Business Research, 12*(9), 1-12. https://doi.org/10.5539/ibr.v12n9p1

Macmbinji, V. (2023). The social model of disability: Implications for inclusion. *International Journal of Innovative Science and Research Technology, 8*(5), 161-165.

Malik, S. (2023). Parental involvement in orientation and mobility within the expanded core curriculum for visually impaired learners in Pakistan: A review of the literature. *Journal of Education, 203*(1), 92-102. https://doi.org/10.1177/00220574221121951

Mason, T. (2014). *Transforming teaching: Implementing mobile technology learning strategies in serving learners with visual impairment*. Texas Tech University.

Mastropieri, A. M., & Scruggs, E. T. (2007). *The inclusive classroom: Strategies for effective instruction*. Upper Saddle River, NJ: Pearson.

Mayer, R. E. (2004). Should there be a three-strikes rule against pure discovery learning?. *American psychologist*, *59*(1), 14. https://doi.org/10.1037/0003- 066X.59.1.14

McBurney, H. D., & White, L. T. (2007). *Research methods* (7th ed.). Thomson Higher Education.

Ministry of Education Science and Technology. (2006). *Strategic plan 2006-2011*.

Ministry of Education Science and Technology. (2010). *The National ICT strategy for education and training*.

Ministry of Education Science and Technology. (2012). *ICT integration in education.* Nairobi: Government Press.

Morse, J. M. (2016). *Mixed method design: Principles and procedures*. Routledge.

Mugo, B. C. (2020). *Assistive technology and access to quality instruction for blind and visually impaired learners: A comparative study of Kenyatta University, Kenya and Syracuse, USA* (Thesis). Kenyatta University.

Munyoro, J., Machimbidza, T., & Mutula, S. (2023). Fostering assistive technology (AT) education and training of academic library professionals in Zimbabwe. *International Information & Library Review, 55*(2), 105-119. https://doi.org/10.1080/10572317.2023.1968316

Murithi, S., Mwirichia, S., & Gichohi, P. M. (2022). Utilization of listening assistive technologies and the academic performance in primary schools for learners with hearing challenges in Meru and Tharaka Nithi counties, Kenya. *International Journal of Professional Practice, 10*(2), 103–114.

Murithi, T., Wanja, M., & Thuranira, N. (2022). Disability rights and education: Legal frameworks and policy implementation in Kenya. *African Journal of Inclusive Education*, *5*(1), 55–70.

Mutua, K. N., & Dimitrov, D. M. (2001). Parents' expectations about future outcomes of children with MR in Kenya: Differential effects of gender and severity of MR. *The*

Journal of Special Education, 35(3), 172–180. https://doi.org/10.1177/002246690103500307

NCTD. (2012). Making tactile graphics. https://www.ncd.org/uk

Neupane, D. K. (2022). Factors Affecting School Participation of Visually Impaired Children. *Scholars' Journal*, 108-121. https://doi.org/10.3126/scholars.v5i1.55789

Newby, J. T., Stepich, A. D., Lehman, D. J., Russel, D. J., Leftwich-Ottenbreit, A. (2011). *Educational technology for teaching and learning*. Pearson.

Nihal, E. (2019). The impact of assistive technology on the educational performance of learners with visual impairment. *The Journal of Elementary Education*.

Njeru, J. W., Musila, N. S., & Kamau-Kang'ethe, R. W. (2024). Selected instructional constraints influencing effective learning among learners' with low vision in public secondary schools in Tharaka Nithi County, Kenya. *International Academic Journal of Social Sciences and Education (IAJSSE), 2*(4), 1-19.

Okolo, C. M., & Ferretti, R. P. (2020). Technology and its impact on reading for students with learning disabilities. In *Handbook of educational psychology and students with special needs* (pp. 625-654). Routledge.

Oranga, J. N., Chege, F., & Kabutha, J. M. (2022). Success among blind students in Kenya: The case of Kenyatta University. Kenyatta University. (Accessed on 7th July 2024).

Orodho, A. J. (2009). *Elements of education and social science research methods.*

Patten, M. (2016). *Questionnaire research: A practical guide*. Routledge.

Patton, M. Q. (2002). *Qualitative Research & Evaluation Methods* (3rd ed.). SAGE Publications.

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.

Phutane, M., Wright, J., Castro, B. V., Shi, L., Stern, S. R., Lawson, H. M., & Azenkot, S. (2022). Tactile materials in practice: Understanding the experiences of teachers of the visually impaired. *ACM Transactions on Accessible Computing (TACCESS), 15*(3), 1-34. https://doi.org/10.1145/3453803

Piaget, J. (1972). *The Psychology of the Child*. New York: Basic Books.

Presley, L., & D'Andrea, M. F. (2009). *Assistive technology for learners who are blind or visually impaired: A guide to assessment*.

Punch, F. K. (2011). *Introduction to research methods in education*. SAGE Publications.

Rehman, A. A., & Alharthi, K. (2016). An introduction to research paradigms. *International Journal of Educational Investigations, 3*(8), 51-59.

Republic of Kenya. (2010). *The Constitution of Kenya, 2010.* Government Printer.

Republic of Kenya. (2018). *National survey on children with disabilities and special needs in education*. Kenya Institute of Special Education (KISE).

Robson, C., & McCartan, K. (2016). *Real World Research* (4th ed.). Wiley.

Rose, D. H., & Meyer, A. (2022). *Teaching every student in the digital age: Universal design for learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *69*(Suppl 2), 107-124. https://doi.org/10.1007/s11577-017-0452-x

Senjam, S. S. (2019). Assistive technology for learners with visual disability: Classification matters. *Kerala Journal of Ophthalmology*, *31*(2), 86-88.

Sensory Solutions Ltd. (2008). *The access technology handbook: Living visually impaired users access to your disability or ICT laboratory*. South Africa: The South African National Council for the Blind.

Shahed, S., Hashmi, M. R., & Hashmi, A. M. (2016). Academic performance, self-efficacy and perceived social support of visually impaired students. *Annals of King Edward Medical University*, *22*(1).

Shakespeare, T. (2006). *Disability rights and wrongs*. Routledge.

Shannon-Baker, P. (2016). Making paradigms meaningful in mixed methods research. *Journal of Mixed Methods Research*, *10*(4), 319-334. https://doi.org/10.1177/1558689815606297

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, *22*(2), 63-75.

Shibina, K. M., & Vidyapeetham, A. V. (2022). Social constructivism: A fundamental approach towards oral development. *Journal of Russian and Comparative Literary Studies*, *22*, 375-380.

Silverman, D. (2013). *Doing Qualitative Research* (4th ed.). SAGE Publications.

Simalalo, M. M. (2021). *Challenges in teaching and learning mathematics by visually impaired pupils*. Lusaka: University of Zambia.

Simalalo, T. (2021). Inclusive education in sub-Saharan Africa: Policy frameworks and practice. *Journal of African Educational Research Network*, *21*(1), 33–44.

Sinclair, J., Unruh, D., Lindstrom, L., & Scanlon, D. (2015). Barriers to sexuality for individuals with intellectual and developmental disabilities: A literature review.

Smith, D. W., Kelly, P., Maushaki, N. J., Griffin-Shirley, N., & Lan, W. Y. (2009). Assistive technology competencies for teachers of students with visual impairments. *Journal of Visual Impairment and Blindness, 103*(8), 457-469.

Smith, W. D., Kelly, M. S., & Kapperman, G. (2011). Assistive technology for learners with visual impairments: A position paper of the Division on Visual Impairments, Council of Exceptional Children.

South African National Council for the Blind. (2012). *Empowering visually impaired people to do what they dare to dream*. Retrieved from http://www.sancb.org.za

Spector, J. M., Ifenthaler, D., Isais, P., Kinshuk, & Sampson, D. (2010). *Learning and instruction in the digital age*. Springer New York Dordrecht Heidelberg London.

Stake, R. E. (2018). Qualitative case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Strategies of qualitative inquiry*. Thousand Oaks, CA: Sage.

Stratton, S. J. (2021). Population research: Convenience sampling strategies. *Prehospital and Disaster Medicine, 36*(4), 373-374.

Su, J., Xu, Y., & Wang, Y. (2020). Inclusive education for students with disabilities: A comparative study between developed and developing countries. *International Journal of Inclusive Education, 24*(9), 979–996. https://doi.org/10.1080/13603116.2018.1503344

Taber, K. S. (2020). Mediated learning leading development. The social development theory of Lev Vygotsky. In *Science education in theory and practice: An introductory guide to learning theory* (pp. 277-291).

Taffe, S. W., & Gwinn, C. B. (2017). *Integrating literacy and technology*. New York: Guilford Press.

Taherdoost, H. (2017). Determining sample size: How to calculate survey sample size. *International Journal of Economics and Management Systems, 2*, 1-7.

Thurlow, M. L., Albus, D., & Lazarus, S. S. (2017). Assessment challenges for learners with disabilities in Zambia. *Educational Measurement: Issues and Practice, 36*(4), 23–30. https://doi.org/10.1111/emip.12164

Thurlow, M. L., Johnstone, C. J., Timmons, J., & Altman, J. R. (2017). Survey of teachers of learners with visual impairments: Learners served and their access to state assessments of reading. Princeton, NJ: Educational Testing Service.

Tobias, S., & Duffy, T. M. (2009). The success or failure of constructivist instruction: An introduction. In *Constructivist instruction* (pp. 15-22). Routledge. https://doi.org/10.4324/9780203878842

Tony, M. P. (2019). The effectiveness of assistive technology to support children with specific learning disabilities: *Teacher perspectives.* Jonkoping University

Vincent, D. A., Okeowo, R. O., & Ariyo, S. (2024). The Use of Assistive Technology for Students with Disabilities in Technical Colleges in Ondo State. *Journal of Educational Research and Practice, 14*(1), 4. https://doi.org/10.5590/JERAP.2024.14.1.04

Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.

Vygotsky, L., & Cole, M. (2018). Lev Vygotsky: Learning and social constructivism. In *Learning Theories for Early Years Practice* (pp. 68-73). UK: SAGE Publications Inc.

Wango, G. M. (2016). *The legal framework for Kenya's educational system.*

Wickham, H., & Wickham, H. (2016). *Data analysis* (pp. 189-201). Springer International Publishing.

World Bank. (2017). Measuring disability preference. Retrieved from http://siteresources.worldbank.org/Disability/Resources/Data/Monprevalence.pdf

World Health Organization (WHO). (2018). *Education of children with visual impairment.*

Yin, R. K. (2017). *Case Study Research and Applications: Design and Methods* (6th ed.). SAGE Publications.

Zayyad, M. M. (2020). The impact of Vygotsky's theoretical framework on the role of mediation for students with learning disabilities. *Research Highlights in Education and Science*.

Zhou, L., & Griffin-Shirley, D. (2021). Assistive technology for students with visual impairments: Challenges and needs in teachers' preparation programs and practice. *Journal of Visual Impairment and Blindness, 105*(4), 197–210.

Zhou, L., & Griffin-Shirley, N. (2021). Teaching students with visual impairment in Hong Kong: Challenges and support. *International Journal of Special Education*, *36*(1), 88–9

APPENDICES

Appendix 1. 1: Introductory Letter

Dear Sir/Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN YOUR SCHOOL

I am Abigael Jepchumba, a postgraduate student at Moi University pursuing a Master of Education in Research. As part of the requirements for my degree, I am conducting a study titled:

"Effect of Integrating Assistive Technologies on Academic Performance for Learners with Visual Impairment in Selected Integrated Secondary Schools in South Rift Counties, Kenya"

The research will involve learners with visual impairment in Status Two to Four. Data will be collected through questionnaires for students, interviews with Special Needs Education (SNE) teachers, and an interview with you as the school principal. I will also use an observation checklist to assess available assistive technologies within the school.

I kindly request your permission to carry out this research in your school. All information collected will be treated with strict confidentiality and used solely for academic purposes. Participation will be voluntary, and no identifying details will be recorded.

Attached are ethical clearance letters from Moi University and NACOSTI for your reference.

Thank you for considering this request. I look forward to your support.

Yours faithfully,

Abigael Jepchumba

Appendix 1. 2: Informed Consent for the Participants

My name is Abigael Jepchumba. I am a Master of education research student from Moi University. I am conducting a study on the **"Effect of Integrating Assistive Technologies on Academic Performance for Learners with Visual Impairment in Selected Integrated Secondary Schools in South Rift Counties, Kenya''.** The information was used by the Ministries of Education and ICT to improve access and quality of education offered to the learners with visual impairment in Kenya and globally.

Procedures to be followed

Participation in this study will require that I ask you some questions through the tools for data collection which will include one or both of the following:

i. The questionnaire ii. The interview schedules

Data will also be collected through observation guide in a routine classroom lesson. The observation checklist was used in ascertaining availability of the assistive technologies available. The data collected will then be recorded for analysis.

You have the right to refuse participation in this study. You will get the same care whether you agree to join the study or not and your decision will not change the attention you will get in the entire teaching and learning process for learners with visual impairment.

Please remember the participation in this study is voluntary. You may ask questions related to the study at any time. You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the teaching and learning process now or any other time in future.

Discomforts and risks

Some of the questions you may be asked may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time.

Benefits

If you participate in this study you will help in advancing the quest for effective Assistive Technologies for the Learners with Visual Impairment in the society which will enable them to realize their potential on academic performance.

Confidentiality

The interview was conducted in a private setting within the school. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping at Moi University. Everything was kept confidential.

Contact information

If you have any questions, you may contact Dr. Njeri Kiaritha on +2547… or Dr Janeth Mlay on +255713552229 or the Moi University Ethical Review Committee Secretariat on

Address: P.O Box 1948-30100,
Eldoret, Kenya

Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions was answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept with

confidentiality and that I can leave the study at any time. I understand that I can still get the same attention in the learning process whether I decide to leave the study or not and my decision will not change the care that I will receive in the teaching and learning process on academic performance now or any other time in the future.

_____ _____

Signature or Thumbprint Date

Researcher's statement

I, the undersigned, have explained to the volunteer in a language s/he understands the procedures to be followed in the study and the risks and benefits involved.

Name of

Researcher: Abigael Jepchumba…….

_____ _____

Signature or Thumbprint Date

Appendix 1. 3: Questionnaire for Learners with Visual Impairment

The purpose of this questionnaire is to get information from you, as learners with visual impairment. Kindly complete each part as instructed. The information provided was treated confidentially. Your sincere responses will be regarded highly. Your response is just your opinion so there is **NO** wrong answer. ***Please do not write your name or any other form of identification.***

Section A: Background Information

a) Which class are you in?

1. Form II ☐
2. Form III ☐
3. Form IV ☐

b) What type of visual impairment do you have?

1. Partial (Low Vision) ☐
2. Total (Blind) ☐

c) Please indicate your age?

1. Below 14 years ☐
2. 15 to 16 years ☐
3. 17 to 18 years ☐
4. Above 19 years ☐

d) Which Grade did you score in the previous end of year examination (e.g C+)? ----------

e) How long have you been using assistive technology in school?

1. Less than 1 year ☐
2. 1 to 2 years ☐
3. Above 3 years ☐

Section B

1. Availability of Status of Assistive Technologies

Tick [√] the column that best describes the availability and usage of each assistive technology in your school.

Sno:	Assistive Technology	Not Available	Available but Not Used	Available and Used
1	Handheld Magnifiers			
2	CCTV (Closed-Circuit Television) Magnification Devices			
3	JAWS Screen Reader			

4	NVDA Screen Reader			
5	Talking Tablets			
6	Large Print Texts			
7	Generic Screen Readers (other than JAWS/NVDA)			
8	Braille Machines			
9	Braille Notetakers			
10	Computer Screen Magnification Software			
11	Audio Books (CDs or Digital Format)			
12	Keyboard Navigation Setup (Shortcuts/Labels)			

Use of Assistive Technology Instructions Support Used

Please indicate your level of agreement with each statement. Scale (1 = Strongly Disagree (SD) | 2 = Disagree (D) | 3 = Neutral (N) | 4 = Agree (A) | 5 = Strongly Agree (SA).

Sno:	Statement	SD	D	N	A	SA
1	I have been taught how to use video magnifiers effectively.					
2	I know how to operate Braille notetakers for class assignments.					
3	I receive instructions on how to use audiobooks in my studies.					
4	I am confident in using keyboard navigation for schoolwork.					
5	Teachers regularly train us on how to use assistive technologies					
6	I can apply what I have learned about assistive technology in different subjects.					

Learner Involvement in Use of Assistive Technologies

Please indicate your level of agreement with each statement. Scale (1 = Strongly Disagree (SD) | 2 = Disagree (D) | 3 = Neutral (N) | 4 = Agree (A) | 5 = Strongly Agree (SA).

Sno:	Statement	SD	D	N	A	SA
1	I use assistive technologies in most of my subjects.					
2	I use assistive technologies on my own without help.					
3	I take initiative to learn how to use assistive technologies.					
4	I feel motivated to use assistive technology while studying.					
5	I regularly practice using assistive technology tools.					
6	I ask for help when I have difficulties using assistive technologies.					
7	I encourage others to use assistive technologies.					

Influence of Assistive Technologies on Academic Performance

Please indicate your level of agreement with each statement. Scale (1 = Strongly Disagree (SD) | 2 = Disagree (D) | 3 = Neutral (N) | 4 = Agree (A) | 5 = Strongly Agree (SA).

Sno:	Statement	SD	D	N	A	SA
1	Assistive technology has helped me perform better in class.					
2	I understand subjects better when I use assistive technology.					
3	I complete assignments faster using assistive devices.					
4	I participate more in class when assistive technologies are used.					
5	My exam results have improved because of assistive technologies.					
6	My teachers include assistive technologies in classroom teaching.					
7	I feel more confident in my studies when I use assistive technologies.					
8	Assistive technologies help me complete my homework independently					
9	When using assistive technologies, I participate more in group or class discussions.					

Appendix 1. 4: Special Needs Education (SNE) Teachers Interview Schedule

Purpose:

To gather qualitative insights from teachers who work directly with learners with visual impairment, particularly about the availability, use, instruction, and impact of Assistive Technologies (ATs) in teaching and learning.

Introduction to the Interview:

Hello. My name is Abigael Jepchumba. I am conducting a study on the effect of integrating Assistive Technologies on academic performance for learners with visual impairment at Selected Integrated Secondary Schools . I'd like to ask you a few questions about your experience as a teacher working with these learners. The discussion will focus on three areas: the availability of Assistive Technologies, how you use them during instruction, the level of learners' involvement, and how all this affects their academic performance. Thank you for taking the time to speak with me.

Guiding Questions for Teachers

- **Availability of Assistive Technologies**

i. What types of Assistive Technologies are currently available for learners with visual impairment in this school?
ii. How did the school acquire these technologies? (e.g., government support, donors, school funds)
iii. Are there any ATs you feel are missing or inadequate?

- **Instructional Use of Assistive Technologies**

iv. How do you incorporate Assistive Technologies into your daily teaching?
v. What kind of training or support have you received to help you use these technologies with your learners?
vi. What challenges do you face when using Assistive Technologies in instruction?

- **Learner Involvement**

vii. How actively do learners with visual impairment use Assistive Technologies during lessons?
viii. Do learners seem confident and independent in using these tools? Why or why not?
ix. What support do you provide when learners struggle to use Assistive Technologies?

- **Effect on Academic Performance**

x. From your experience, how have Assistive Technologies impacted the academic performance of learners with visual impairment?
xi. Can you share specific examples where ATs helped improve a learner's understanding, participation, or performance?
xii. In your view, what could be done to improve the effectiveness of ATs in supporting academic outcomes?

Appendix 1. 5: Interview Schedule for the Principals

Purpose:

To gather insights from the school head on institutional support, resource allocation, and leadership practices related to the use and management of Assistive Technologies for learners with visual impairment.

Introduction to the Interview:

Hello. My name is Abigael Jepchumba. I'm conducting a study on the effect of integrating Assistive Technologies on academic performance for learners with visual impairment at Selected Integrated Secondary Schools. I'd like to ask you about the school's role in managing, supporting, and overseeing the use of these technologies. Thank you for agreeing to participate.

Guiding Questions for the Principal

- **Availability and Management of Assistive Technologies**

i. What Assistive Technologies are available in the school for learners with visual impairment?
ii. How does the school source and maintain these technologies?
iii. Are there policies or plans in place to expand or improve access to Assistive Technologies?

- **Support for Teachers and Learners**

iv. What training or support is provided to teachers on the use of Assistive Technologies?
v. How does the school support learners with visual impairment in using these technologies?
vi. Are there specific staff members or departments responsible for AT support?

- **Monitoring and Evaluation**

vii. How does the school monitor the use and effectiveness of Assistive Technologies in classrooms?
viii. Are there ways in which learner outcomes or teacher performance are evaluated in relation to AT use?

- **Academic Impact**

ix. From your perspective, what changes, if any, have you observed in academic performance among learners with visual impairment since ATs were introduced?
x. What challenges has the school faced in implementing ATs?
xi. What additional support would the school need to improve the integration of Assistive Technologies?

Appendix 1. 6: Observation Checklist for Assistive Technologies Purpose

This checklist is designed to guide observation of the availability, accessibility, and actual use of Assistive Technologies (ATs) for learners with visual impairment at Selected Integrated Secondary Schools.

Sno:	Assistive Technologies	Available and in use	Available and not in use	Not available	Condition (Good/Fair/Poor)	Remarks (e.g., storage, visibility, actual use)
1	Handheld Magnifiers					
2	CCTV (Closed-Circuit Television) Magnification					
3	JAWS Screen Reader					
4	NVDA Screen Reader					
5	Talking Tablets					
6	Large Print Texts					
7	Generic Screen Readers (other than JAWS/NVDA)					
8	Braille Machines					
9	Braille Notetakers					
10	Computer Screen Magnification Software					
11	Audio Books (CDs or Digital Format)					
12	Keyboard Navigation Setup (Shortcuts/Labels)					

Appendix 1. 7: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **735329**

Date of Issue: **06/February/2024**

RESEARCH LICENSE

This is to Certify that Miss.. ABIGAEL JEPCHUMBA KOSGEI of Moi University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kericho on the topic: EFFECT OF INTEGRATING ASSISTIVE TECHNOLOGIES ON ACADEMIC PERFORMANCE FOR LEARNERS WITH VISUAL IMPAIRMENT: A CASE OF KIPSIGIS GIRLS , KERICHO COUNTY, KENYA for the period ending : 06/February/2025.

License No: **NACOSTI/P/24/32864**

735329

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix 1. 8: Plagiarism Awareness Certificate

SR1012

ISO 9001:2019 Certified Institution

THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

ABIGAEL JEPCHUMBA

MS/R/5051/23

In recognition for passing the University's plagiarism

Awareness test for Thesis **entitled: EFFECT OF INTEGRATING ASSISTIVE TECHNOLOGIES ON ACADEMIC PERFORMANCE FOR LEARNERS WITH VISUAL IMPAIRMENT IN SELECTED INTEGRATED SECONDARY SCHOOLS IN KERICHO COUNTY, KENYA with** similarity index of 7% and striving to maintain academic integrity.

Word count:21262

Awarded by

Prof. Anne Syomwene Kisilu
CERM-ESA Project Leader Date: 18/09/2025