African Journal of Emerging Issues
Peer reviewed | Double blind | Interdisciplinary

African Journal of Emerging Issues (AJOEI)
Online ISSN: 2663 - 9335
Available at: https://ajoeijournals.org

EDUCATION CATEGORY

MODERATING ROLE OF LEARNERS' ATTITUDES TOWARDS ASSISTIVE DEVICES IN IMPROVING ACADEMIC PERFORMANCE OF PRIMARY SCHOOL PUPILS WITH HEARING CHALLENGES IN MERU AND THARAKA NITHI COUNTIES, KENYA

[1*]Sabina Murithi, [2]Severina Mwirichia & [3]Paul Maku Gichohi
[1&2]Kenya Methodist University, Meru, Kenya
[3]University of Eldoret, Eldoret, Kenya
***Email of the Corresponding Author: sabinamurithi@gmail.com**

Publication Date: April, 2026

ABSTRACT

Purpose of the Study: The study sought to investigate the moderating role of learners' attitudes toward assistive devices in the relationship between assistive technology utilization and academic performance among pupils with hearing impairments in primary schools in Meru and Tharaka Nithi Counties.

Statement of the Problem: Despite Kenya's comprehensive legal frameworks mandating equitable education for learners with disabilities, pupils with hearing impairments in primary schools persistently score between 100 and 200 marks against the national average of 250. This persistent performance gap, particularly evident in Meru and Tharaka Nithi Counties, raises concerns about the effectiveness of existing interventions.

Methodology: Guided by Bandura's Social Cognitive Theory (1986), the study employed a descriptive survey design across three special primary schools, drawing a sample of 98 respondents from a population of 318 using proportionate and purposive sampling, with data collected through questionnaires, interview schedules, and focus group discussions, validated through piloting (Cronbach's alpha ≥ 0.71), and analyzed using SPSS v26 for quantitative data and thematic analysis for qualitative data.

Findings: The findings revealed that 55.8% of learners held negative attitudes toward assistive devices, largely driven by stigma (65.2%), inadequate technical support, and limited teacher encouragement. Moderated Multiple Regression analysis confirmed that learners' attitudes significantly moderate the relationship between assistive technology utilization and academic performance ($\Delta R^2 = .063$, $p = .006$). The full model accounted for 37.9% of the variance in academic performance.

Conclusion: The study concludes that learners' attitudes toward assistive devices play a significant role in shaping the effectiveness of assistive technology in improving academic performance.

Recommendations: The Ministry of Education should implement targeted anti-stigma campaigns to promote positive perceptions of assistive devices. The Teachers Service Commission should integrate attitude-focused training modules into teacher education programs. In addition, schools should establish peer mentorship structures and strengthen technical support systems to enhance the effective utilization of assistive technologies.

Keywords: *Learners' attitudes, assistive technology, hearing impairment, academic performance, special needs education*

INTRODUCTION

Hearing impairment constitutes a significant global health and educational challenge, affecting approximately 34 million children worldwide (World Health Organization [WHO], 2021). The condition encompasses partial, moderate, severe, or complete hearing diminution resulting from damage to the outer, middle, or inner ear (Musonda & Phiri, 2017). For affected learners, hearing loss profoundly impacts language acquisition, literacy development, classroom participation, and ultimately, academic achievement (Marschark et al., 2015).

Kenya has demonstrated considerable policy commitment to addressing educational equity for learners with disabilities. The Constitution of Kenya (2010), Article 53(1)(b), guarantees every child the right to free and compulsory basic education, irrespective of disability status. This provision is operationalized through the Basic Education Act (2013), the Persons with Disabilities Act (2003), and the National Special Needs Education Policy Framework (2009). Furthermore, Kenya has embraced international frameworks including the Salamanca Statement and the Education for All goals, while recognizing Kenyan Sign Language as an official language and medium of instruction (Kalya, 2020).

Despite these legislative interventions, academic performance among learners with hearing impairments in Kenyan primary schools remains persistently below national expectations. Sambu et al. (2018) reported that when ranked alongside hearing counterparts, learners with hearing impairments consistently occupy the lowest performance quintiles in national examinations, with mean scores ranging between 100 and 200 marks against the national average of 250 points. This underperformance pattern is particularly pronounced in Meru and Tharaka Nithi Counties, where studies have documented inadequate resources and consistently poor academic outcomes among hearing-impaired learners (Muguna, 2011; Murithi, 2014; Mwoma, 2017).

Within the spectrum of factors influencing academic outcomes, learners' attitudes toward assistive devices have emerged as potentially critical determinants of technology utilization effectiveness. According to Veresova and Mala (2016), attitudes encompass affective feelings toward devices, conative behavioral tendencies, and cognitive beliefs about technology value. Positive attitudes promote consistent device utilization, while negative attitudes—often stemming from stigma, mockery, or perceived inconvenience—undermine the potential benefits of assistive technologies (Soetan et al., 2021). However,

within the Kenyan context and specifically within Meru and Tharaka Nithi Counties, the moderating role of learners' attitudes in the relationship between assistive device utilization and academic performance remains substantially under-researched, representing a critical gap in understanding how to optimize educational outcomes for hearing-impaired learners.

Statement of the Problem

The Kenyan government has established comprehensive legal and policy frameworks to support learners with special needs, including the Constitution of Kenya (2010), the Basic Education Act (2013), and the National Special Needs Education Policy Framework (2009). These instruments mandate equal access to quality education and have been complemented by increased budgetary allocations for special needs education, teacher training, and provision of assistive technologies (Jitolee, 2016; Kalya, 2020). Despite these interventions, academic performance among learners with hearing impairments in primary schools remains persistently below the national average of 250 marks, with affected learners consistently scoring between 100 and 200 marks in national examinations (Musonda & Phiri, 2017; Sambu et al., 2018). This underperformance is particularly pronounced in Meru and Tharaka Nithi Counties, where studies have documented inadequate learning resources, insufficiently trained personnel, and consistently poor academic outcomes among hearing-impaired learners (Muguna, 2011; Murithi, 2014; Mwoma, 2017).

Research has established that assistive technologies can enhance learning outcomes for hearing-impaired learners (Masayi, 2020; Soetan et al., 2021). However, the mere availability of assistive devices does not guarantee their effective utilization. Emerging evidence suggests that learners' attitudes toward assistive devices may significantly influence the extent to which these technologies are embraced and consistently used, thereby moderating their impact on academic performance (Awori et al., 2010; Kayere et al., 2016; Soetan et al., 2021). While existing studies have examined factors affecting academic performance among hearing-impaired learners, including sign language proficiency (Kalya, 2020), teaching methods (Kathare, 2020), and inclusive education practices (Nyambere & Okello, 2021), the specific moderating role of learners' attitudes toward assistive devices in the relationship between technology utilization and academic achievement remains conspicuously under-researched in the Kenyan context. This study seeks to address this gap by investigating how learners' attitudes moderate the relationship

between assistive device utilization and academic performance among primary school pupils with hearing challenges in Meru and Tharaka Nithi Counties.

The Learners' Attitude towards the Utilization of Assistive Technology

Learners' attitude encompasses the beliefs, feelings, opinions, perceptions, and behavioral tendencies that learners exhibit toward the use of assistive devices, toward personnel attending to them, and toward the learning environment (Veresová & Malá, 2016). According to Veresová and Malá (2016), attitudes comprise three dimensions: affective feelings toward the device, conative behavioral tendencies regarding device use, and cognitive beliefs about the value and utility of assistive technologies.

The attitudes of learners with hearing impairments toward assistive technologies may be positive or negative. Positive attitudes are promoted by the severity of hearing loss, the quality of sound delivered by devices, and the responsiveness of the environment, including acceptance by parents, peers, and teachers (Rekkedal, 2012; Soetan et al., 2021). Conversely, negative attitudes often stem from stigma, mockery, lack of acceptance of one's disability condition, inadequate technical support, and poorly maintained or inappropriate devices (Khairuddin, 2019; Jorgensen & Messersmith, 2015). Soetan et al. (2021) established that students with hearing impairments were enthusiastic about using assistive equipment in the classroom, implying that positive attitudes significantly influence technology utilization for learning.

The relationship between attitudes and academic performance is well-documented. Soetan et al. (2021) posited that academic achievement among hard-of-hearing learners is directly influenced by their attitudes toward assistive technologies. Wood et al. (2017) and Tony (2019) demonstrated that assistive technology utilization, mediated by positive attitudes, contributes to independence in thinking and improved educational outcomes. Furthermore, learners' positive attitudes have been linked to increased classroom participation, enhanced communication skills, and ultimately better examination performance (Amurani, 2019; Ndlovu, 2021).

Despite the recognized importance of attitudes, limited research has examined their moderating role in the relationship between assistive technology utilization and academic performance among hearing-impaired learners, particularly in the Kenyan context. While studies have explored teachers' perceptions and the efficacy of assistive technologies (Ahmed, 2018; Kundu et al., 2020), the specific moderating function of learners' attitudes

remains under-investigated. This gap is significant given evidence that even when assistive devices are available, negative attitudes can impede utilization and diminish potential academic benefits (Awori et al., 2010; Kayere et al., 2016). Addressing learners' attitudes through sensitization, counseling, and creating supportive environments may therefore be critical for optimizing assistive technology outcomes.

Theoretical underpinning

This study was informed by Bandura's Social Cognitive Theory (1986), which posits that self-efficacy beliefs constitute the foundation for human motivation, well-being, and personal accomplishments. Bandura (1986) argued that self-beliefs influence behavior, perseverance, and achievement outcomes; without belief in themselves, individuals have little reason to act or persist in facing challenges. The theory identifies four sources of self-efficacy: mastery experiences, vicarious learning, social persuasion, and physiological states. Applying this theory to the current study, learners' attitudes toward assistive devices—shaped by their self-efficacy beliefs—moderate the relationship between technology utilization and academic performance. Learners with positive self-efficacy beliefs are more likely to embrace assistive technologies, persist in using them despite challenges, and consequently realize greater academic benefits (Soetan et al., 2021). Conversely, negative attitudes rooted in low self-efficacy diminish technology utilization and its potential academic impact. Thus, Social Cognitive Theory provides a robust framework for understanding how learners' attitudes moderate the effectiveness of assistive technologies in improving academic performance among hearing-impaired pupils.

METHODOLOGY

This study adopted a descriptive survey research design to investigate the moderating role of learners' attitudes toward assistive devices in improving academic performance among primary school pupils with hearing challenges in Meru and Tharaka Nithi Counties, Kenya. The descriptive design was appropriate for obtaining opinions, attitudes, and perceptions while establishing relationships between variables without manipulating existing conditions (Creswell, 2018). The study was conducted in the three special primary schools serving learners with hearing impairments across the two counties, namely Kaaga Primary School for the Hearing Impaired (Meru County), Njia Primary School for the Hearing Impaired (Meru County), and Kamatungu Primary School for the Hearing Impaired (Tharaka Nithi County).

The target population comprised 318 respondents, distributed as follows: 3 head teachers, 42 teachers, 29 non-teaching staff, 242 learners with hearing difficulties, and 2 County Directors of Education (Murithi, 2022). Following Mugenda and Mugenda's (2003) recommendation of 30% representation, proportionate sampling was employed. All 3 head teachers and both County Directors were purposively selected due to their strategic positions and specialized knowledge (Patton, 2015). Simple random sampling was used to select 13 teachers (30% of 42), 9 technical staff (30% of 29), and 73 learners (30% of 242) from the three schools.

Data were collected using questionnaires for learners, interview schedules for head teachers and County Directors, and focus group discussion guides for teachers and support staff. The instruments were piloted at Isiolo Primary School for Hearing Impaired Learners to establish validity and reliability (Kothari, 2014). Quantitative data were analyzed using SPSS version 26, generating descriptive statistics (means, percentages, standard deviations), while qualitative data were subjected to thematic analysis (Creswell, 2012). Findings were presented using tables and narratives.

RESULTS AND DISCUSSION

This study investigated the moderating role of learners' attitudes toward assistive devices in improving academic performance among primary school pupils with hearing challenges in Meru and Tharaka Nithi Counties, Kenya. The findings are presented in accordance with the study's objectives, beginning with respondent characteristics, followed by the relationship between assistive technology utilization and academic performance, and culminating with moderation analysis results.

Respondent Characteristics

The study achieved a response rate of 94.5%, with 86 valid questionnaires from learners, 100% participation from head teachers (n=3) and County Directors of Education (n=2), and 81.8% attendance in focus group discussions. As shown in Table 1, reliability analysis yielded Cronbach's alpha coefficients exceeding the acceptable threshold of 0.7 for all variables, confirming internal consistency (Bryman & Bell, 2011).

Table 1: Reliability Results

Variable	Cronbach's Alpha
Learners' Attitudes (Moderator)	0.713
Academic Performance (Dependent Variable)	0.862

Demographic analysis revealed that 55.8% of learners were female, consistent with findings by Masayi (2020) and Yabbi (2015), who attributed gender disparities to cultural practices and enrolment patterns. Teachers were predominantly P1 certificate holders (90%) with over six years of experience, indicating adequate qualifications for handling learners with hearing impairments.

Learners' Attitudes Toward Assistive Devices

The findings revealed predominantly negative attitudes toward assistive devices among learners with hearing impairments. As presented in Table 2, 48 learners (55.8%) indicated they did not like wearing assistive devices daily, while only 25 (29.1%) expressed positive attitudes toward daily device usage. Furthermore, 54 learners (62.8%) reported not enjoying utilizing assistive devices in classroom and outside environments, compared to only 21 (24.4%) who affirmed enjoyment.

Table 2: Learners' Attitudes Toward Assistive Devices (N=86)

Statement	Disagree n(%)	Agree n(%)	Mean
I like wearing assistive devices daily	48(55.8)	25(29.1)	2.60
I enjoy utilizing assistive devices	54(62.8)	21(24.4)	2.48
Wearing devices has made me perform well in examinations	41(47.7)	32(37.2)	2.99
Learners face stigma and mockery for wearing devices	56(65.2)	21(24.5)	2.47

Statement	Disagree n(%)	Agree n(%)	Mean
The availability of devices boosts my morale	55(64.0)	19(22.1)	2.45
My teachers encourage me to wear assistive devices	52(60.4)	18(21.0)	2.56
The hearing assistive devices are user-friendly	41(47.7)	32(37.2)	2.99
I don't like wearing devices because no one helps me fix them	57(66.3)	18(21.0)	2.52

Significantly, 56 learners (65.2%) reported experiencing stigma, criticism, and mockery from hearing counterparts when wearing assistive devices, while only 21 (24.5%) disagreed with this observation. This finding aligns with Khairuddin (2019) and Johnson (2021), who documented that negative attitudes toward assistive technology are often precipitated by social stigma and environmental insensitivity. Additionally, 41 learners (47.7%) did not perceive assistive devices as user-friendly, while 55 (64.0%) indicated that device inadequacy lowered their morale. Regarding teacher support, 52 learners (60.4%) felt that teachers did not provide adequate encouragement for device utilization, with only 18 (21.0%) affirming teacher encouragement.

During focus group discussions, teachers corroborated these findings. One participant noted:

> *"Learners often remove their hearing aids when they go out to play because they fear being mocked by others. Some even hide them when visitors come to the school. This inconsistency in usage affects their learning continuity."*

These observations resonate with Soetan et al. (2021), who emphasized that learners' attitudes significantly influence assistive technology utilization patterns, and with Wairimu et al. (2018), who identified negative attitudes as significant barriers to effective technology adoption among learners with disabilities. The high proportion of learners

experiencing stigma (65.2%) and the low levels of teacher encouragement (only 21.0%) suggest systemic environmental factors that perpetuate negative attitudes, consistent with findings by Rekkedal (2012) that supportive environments are critical for fostering positive attitudes toward assistive technology.

The finding that 41 learners (47.7%) did not perceive devices as user-friendly, yet 57 (66.3%) indicated willingness to use devices if technical support were available, suggests that addressing technical support gaps could significantly improve attitudes and subsequent utilization patterns.

Relationship Between Assistive Technology Utilization and Academic Performance

The study assessed the relationship between assistive technology utilization and academic performance. Correlation analysis revealed a positive but weak relationship ($r = .237$, $p < .05$), indicating that assistive technology utilization significantly influences academic achievement. However, as shown in Table 3, the regression model with three assistive technology predictors (listening, augmentative and alternative, and alerting technologies) accounted for only 15.1% of the variance in academic performance ($R^2 = .151$, $F = 4.871$, $p = .004$).

Table 3: Model Summary for Assistive Technology and Academic Performance

Model	R	R^2	Adjusted R^2	F	Sig.
1	.389	.151	.120	4.871	.004

These findings suggest that while assistive technologies contribute to academic performance, other factors—including learners' attitudes—may play critical roles in determining the extent of their effectiveness. This aligns with Marschark et al. (2015), who observed that academic achievement among hearing-impaired learners is influenced by multiple individual, household, and environmental factors beyond technology availability alone.

Moderating Effect of Learners' Attitudes

Moderated Multiple Regression (MMR) analysis was conducted to determine whether learners' attitudes moderated the relationship between assistive technology utilization and academic performance. Table 4 presents the moderation results.

Table 4: Moderation Effect of Learners' Attitudes

Model	R^2	ΔR^2	F Change	Sig. F Change
Model 1 (Predictors only)	.151	.151	4.871	.004
Model 2 (Predictors + Moderator)	.316	.165	19.575	.000
Model 3 (Predictors + Moderator + Interaction)	.379	.063	8.080	.006

The results indicate that in Model 1, the three assistive technology predictors accounted for 15.1% of the variance in academic performance. When learners' attitudes were introduced as a predictor in Model 2, the explained variance increased significantly to 31.6% ($\Delta R^2 = .165$, $p = .000$), demonstrating that attitudes independently contribute to academic performance.

Most importantly, when the interaction term (attitudes × assistive technology) was introduced in Model 3, the explained variance increased further to 37.9% ($\Delta R^2 = .063$, $p = .006$). This significant interaction effect confirms that learners' attitudes moderate the relationship between assistive technology utilization and academic performance. The regression coefficients in Table 5 further illuminate this moderation effect.

Table 5: Regression Coefficients for Moderation Model

Variable	β	t	Sig.
Constant	-2.387	-1.724	.089
Assistive Technologies (X)	.523	2.668	.009
Learners' Attitudes (M)	1.599	3.806	.000
Interaction Term (X×M)	-.462	-2.852	.006

These findings indicate that learners' attitudes significantly strengthen or weaken the relationship between assistive technology utilization and academic performance. When learners hold positive attitudes toward assistive devices, the beneficial effects of technology on academic performance are enhanced. Conversely, negative attitudes diminish the potential academic benefits of assistive technologies, even when devices are available and accessible.

This moderating role of attitudes finds theoretical support in Bandura's (1986) Social Cognitive Theory, which posits that self-efficacy beliefs and attitudes shape behavioral outcomes. Learners with positive attitudes demonstrate greater persistence in device utilization, seek help when needed, and integrate technology more effectively into their learning processes (Soetan et al., 2021). The findings also align with Tony (2019) and Wood et al. (2017), who documented that positive attitudes toward assistive technologies enhance classroom participation, communication skills, and ultimately academic achievement.

During interviews, one head teacher provided insight into how attitudes manifest in academic outcomes:

> *"We have learners with identical hearing aids and similar hearing loss levels. Those who embrace their devices, wear them consistently, and participate actively in class perform significantly better than those who resist using them. The difference is not in the device but in the child's mindset."*

This observation underscores the critical role of psychological factors in determining educational outcomes among learners with hearing impairments, consistent with Awori et al. (2010), who established significant relationships between self-esteem and academic achievement among girls with hearing impairments in Kenya.

Qualitative Insights on Attitudinal Barriers

Focus group discussions and interviews revealed multiple factors contributing to negative attitudes. Stigma emerged as the predominant concern, with 74.4% of learners indicating they had witnessed or experienced mockery for wearing assistive devices. Teacher inadequacy in providing technical support and insufficient sensitization programs were also cited as contributing factors. One technical staff member explained:

> *"When devices malfunction and we cannot repair them promptly, learners become frustrated and lose confidence in the technology. They start viewing the devices as unreliable, and this negative perception persists even after repairs."*

These qualitative insights corroborate Jorgensen and Messersmith (2015), who identified inadequate technical support and device unreliability as significant contributors to negative attitudes among assistive technology users.

CONCLUSION

This study concludes that learners' attitudes toward assistive devices significantly moderate the relationship between technology utilization and academic performance among primary school pupils with hearing challenges in Meru and Tharaka Nithi Counties. Negative attitudes, stemming from stigma, inadequate technical support, and insufficient teacher encouragement, diminish the potential academic benefits of assistive technologies. The findings underscore that device availability alone is insufficient; addressing attitudinal barriers through sensitization, counseling, and creating supportive school environments is critical for optimizing assistive technology outcomes. The study notes that interventions targeting attitude amelioration can substantially enhance academic performance among hearing-impaired learners.

RECOMMENDATIONS

The study recommends that the Ministry of Education develop and implement comprehensive anti-stigma campaigns and peer counseling programs in all primary schools serving learners with hearing impairments to foster positive attitudes toward assistive devices. The Teacher Service Commission, in collaboration with the Kenya Institute of Special Education, should integrate attitude-focused training modules into teacher preparation programs, equipping educators with skills to encourage and support learners in consistent device utilization. School administrators should establish regular sensitization forums for learners, parents, and communities to demystify hearing assistive technologies and address misconceptions. Additionally, schools should institute peer mentorship programs where learners with positive device experiences support those struggling with acceptance, and ensure reliable technical support systems to prevent device malfunction-related discouragement. These targeted interventions address identified attitudinal barriers and could significantly enhance assistive technology effectiveness in improving academic performance.

REFERENCES

Ahmed, A. (2018). Perceptions of using assistive technology for students with disabilities in the classroom. *International Journal of Special Education, 33*(1), 129-139. https://eric.ed.gov/?id=EJ1184079

Amurani, B. (2019). *Impact of assistive technology on education performance of learners with visual impairment at the University of Rwanda-College of education* [Doctoral dissertation, University of Rwanda]. University of Rwanda Institutional Repository. http://www.dr.ur.ac.rw/handle/123456789/619

Awori, B. B., Mugo, J. K., Orodho, J. A., & Karugu, G. K. (2010). The relationship between self-esteem and academic achievement of girls with hearing impairments in secondary schools for the deaf in Kenya. *Journal of the American Academy of Special Education Professionals,* 38-51. https://eric.ed.gov/?id=EJ1137053

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Basic Education Act, No. 14 of 2013, Government of Kenya (2013).

Bryman, A., & Bell, E. (2011). *Business research methods* (3rd ed.). Oxford University Press. https://doi.org/10.1093/hebz/9780199583409.001.0001

Constitution of Kenya, (2010). http://www.kenya-informationguide.com/support-files/the_constitution_of_kenya.pdf

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson. http://elibrary.mel.org/record=b43421531

Creswell, J. W. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications. https://doi.org/10.4135/9781071819096

Jitolee, V. S. O. (2016). *Kenya national special needs education survey report*. VSO Jitolee, Ministry of Education, Science and Technology.

Johnson, E. (2021). *Disability, stigma and assistive technology*. Leonard Cheshire. https://www.leonardcheshire.org/our-impact/stories/disability-stigma-and-assistive-technology

Jorgensen, L. E., & Messersmith, J. J. (2015). Impact of aging and cognition on hearing assistive technology use. *Seminars in Hearing*, *36*(3), 162-174. https://doi.org/10.1055/s-0035-1555119

Kalya, J. K. (2020). *Effect of Kenyan sign language on academic performance of learners with hearing impairment: Case of Kedowa special school, Kericho County, Kenya* [Doctoral dissertation, Kenyatta University]. Kenyatta University Institutional Repository.

Kathare, N. M. (2020). *Effect of teaching methods on academic performance in mathematics among learners with hearing impairment in Meru County, Kenya* [Doctoral dissertation, Kenyatta University]. Kenyatta University Institutional Repository.

Kayere, P. L., Chumba, S. K., & Kapkiai, M. (2016). Technical and visual aid services as determinants to academic progress of learners with learning impairments in early childhood education in Kenya. *Africa International Journal of Management Education and Governance*, *1*(2), 90-99. https://kerd.ku.ac.ke/handle/123456789/848

Khairuddin, K. F. (2019). *The inclusion of deaf children in Malaysian primary schools: Experiences of parents, staff members and children* [Doctoral dissertation, University of Manchester]. ProQuest Dissertations Publishing. https://www.proquest.com/openview/f92d10805ccfda35bc8809f7447d1500/

Khairuddin, K. F., Miles, S., & McCracken, W. (2018). Deaf learners' experiences in Malaysian schools: Access, equality and communication. *Social Inclusion*, *6*(2), 46-55. https://doi.org/10.17645/si.v6i2.1345

Kothari, C. R. (2014). *Research methodology: Methods and techniques* (4th ed.). New Age International. http://library.amizone.net/cgi-bin/koha/opac-detail.pl?biblionumber=120213

Kundu, A., Bej, T., & Dey, K. N. (2020). Indian educators' awareness and attitude towards assistive technology. *Journal of Enabling Technologies*, *14*(4), 233-251. https://doi.org/10.1108/JET-04-2020-0015

Marschark, M., Shaver, D. M., Nagle, K. M., & Newman, L. A. (2015). Predicting the academic achievement of deaf and hard-of-hearing students from individual,

household, communication, and educational factors. *Exceptional Children, 81*(3), 350-369. https://doi.org/10.1177/0014402914563700

Masayi, D. (2020). *Relationship between utilization of assistive hearing technology and academic achievement of learners in schools for the deaf in Kakamega County, Kenya* [Master's thesis, Kenyatta University]. Kenyatta University Institutional Repository. https://ir-library.ku.ac.ke/handle/123456789/21351

Ministry of Education. (2009). *The national special needs education policy framework*. Government of Kenya.

Mugenda, O. M., & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative approaches*. Acts Press. https://library.unesco.go.ke/cgi-bin/koha/opac-detail.pl?biblionumber=6341

Muguna, F. G. (2011). *Perception on the factors influencing performance of pre-school children with hearing impairment: A case of Kaaga School, Imenti North District* [Doctoral dissertation, University of Nairobi]. University of Nairobi Digital Repository.

Murithi, R. M. (2014). *School factors influencing implementation of inclusive education in public primary schools in Magumoni Division, Tharaka Nithi County, Kenya* [Doctoral dissertation, University of Nairobi]. University of Nairobi Digital Repository.

Murithi, S. (2022). *Utilization of assistive technology in improving academic performance in primary schools for learners with hearing challenges in Meru and Tharaka Nithi Counties, Kenya* [Doctoral thesis, Kenya Methodist University]. Kenya Methodist University Repository.

Musonda, M. N., & Phiri, W. (2017). Emerging factors affecting academic performance of learners with hearing impairments at grade nine level in selected schools in the Northern Province of Zambia. *International Journal of Research in Informative Science Application and Techniques, 1*(7), 1-18.

Mwoma, T. (2017). Education for children with special needs in Kenya: A review of related literature. *Journal of Education and Practice, 8*(28), 188-200.

Ndlovu, S. (2021). Provision of assistive technology for students with disabilities in South African higher education. *International Journal of Environmental Research and Public Health, 18*(8), 3892. https://doi.org/10.3390/ijerph18083892

Nyambere, H. A., & Okello, L. M. (2021). *Influence of verbal communication on academic performance of learners with hearing impairment in inclusive settings in Migori County, Kenya* [Doctoral dissertation, Rongo University]. Rongo University Repository.

Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). SAGE Publications. https://catalogue.library.torontomu.ca/record=b43421531

Persons with Disabilities Act, No. 14 of 2003, Government of Kenya (2003).

Rekkedal, A. M. (2012). Assistive hearing technologies among students with hearing impairment: Factors that promote satisfaction. *Journal of Deaf Studies and Deaf Education*, *17*(4), 499-517. https://doi.org/10.1093/deafed/ens023

Sambu, M. C., Otube, N., & Bunyasi, B. A. (2018). Assessment of academic performance of learners with hearing impairment in selected special primary schools in Kenya. *International Journal of Education and Research*, *6*(2), 1-12.

Soetan, A. K., Onojah, A. O., Alaka, T. B., & Onojah, A. A. (2021). Attitude of hearing impaired students towards assistive technology utilization in Oyo State adopting the survey method. *Indonesian Journal of Community and Special Needs Education*, *1*(2), 103-118. https://ejournal.upi.edu/index.php/IJCSNE/article/view/36963

Tony, M. P. (2019). *The effectiveness of assistive technology to support children with specific learning disabilities: Teacher perspectives* [Master's thesis, Jönköping University]. DIVA Portal. https://www.diva-portal.org/smash/record.jsf?pid=diva2:1321161

Veresová, M., & Malá, D. (2016). Attitude toward school and learning and academic achievement of adolescents. In *7th International Conference on Education and Educational Psychology*. Future Academy. https://www.europeanproceedings.com/article/10.15405/epsbs.2016.11.84

Wairimu, C. M., Chomba, J. M., & Awori, B. B. (2018). Factors influencing the use of assistive technology in teaching mathematics to learners with visual impairments

in special primary schools in Kenya. *Academic Research International*, *9*(1), 154-161. https://ir-library.ku.ac.ke/handle/123456789/18390

Wood, S. G., Moxley, J. H., Tighe, E. L., & Wagner, R. K. (2017). Does use of text-to-speech and related read-aloud tools improve reading comprehension for students with reading disabilities? A meta-analysis. *Journal of Learning Disabilities*, *51*(1), 73-84. https://doi.org/10.1177/0022219416688170

World Health Organization. (2021). *Deafness and hearing loss*. https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss

Yabbi, J. O. P. (2015). *Influence of socio-economic and cultural factors on academic performance of hearing impaired pupils at St. Martin Primary School, Kakamega County, Kenya* [Doctoral dissertation, Catholic University of Eastern Africa]. CUEA Repository. http://ir.cuea.edu/jspui/handle/1/114