

Utilization of Listening Assistive Technologies and the Academic Performance in Primary Schools for Learners with Hearing Challenges in Meru and Tharaka Nithi Counties, Kenya

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Abstract

The government of Kenya has established measures such as training and employment of teachers to deliver quality education to learners with hearing challenges. However, the academic performance in primary schools for learners with hearing impairments has been poor. This study investigated the effect of utilizing assistive technologies on the academic performance in primary schools for learners with hearing challenges in Meru and Tharaka Nithi counties, Kenya. It specifically examined the effect of listening assistive technologies on academic performance. It was guided by the capability theory. The three hearing-impaired special schools in Meru and Tharaka Nithi County were the study's sample. There were 91 pupils, 13 teachers, and 9 technical support personnel. Three school principals and 2 County Educational Directors for Education were interviewed. The study design used was a cross-sectional survey. Questionnaires, an interview guide, a focused group discussion, and document analysis were utilized to collect data. Descriptive statistics and correlation were used to analyze the quantitative data, while the thematic technique was used on qualitative data. The findings were presented using tables, figures and identified themes. To address the validity and reliability of the research instruments, a pre-test was conducted. The study discovered a positive link between the use of listening assistive devices and academic achievement in primary schools for students with hearing impairments. It also noted a low usage of listening assistive technologies, which was ascribed to listening assistive device inadequacy, a lack of skills for utilizing them, poor equipment maintenance, and a lack of appropriate support from schools, government, family, and the community. The Ministry of Education should develop a strategy to acquire all the necessary listening assistive technology equipment for students with hearing impairments in all primary schools. Head teachers were advised to develop training strategies for complicated listening assistive devices to reduce the rate of breakages and breakdowns. The findings have implications on curriculum, hiring of teaching and non-teaching staff, funding, and teaching practices.

Keywords: *Hearing challenged learners, listening assistive technologies, academic performance, special public schools, counties of Meru and Tharaka Nithi, hearing impairment*

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1.0 Introduction

Education is a fundamental right that is essential for all students, regardless of their condition. Students with hearing impairments require specialized teaching methods, instructional media, a learning environment, classroom management, and test administration (Alshutwi et al., 2020; Su et al., 2020). Hearing difficulties are a temporary or permanent condition characterized by partial, moderate, severe to conductive, sensory neural diminishment, or complete hearing loss in one, unilateral, or both ears as a result of malformation, malfunctioning, or damage to the outer ear, middle ear, inner ear, or the hearing control center in the brain (Amesi & Yellowe, 2018; WHO, 2021).

One of the devices meant to help persons with hearing difficulties is listening assistive technology. Listening assistive devices are intended to qualify sound by removing background noise, gaining attention, and being aware of the desired sound. For learners with hearing issues across the world, academic accomplishment has been utilized as an indicator of appropriate resources and other support systems in form of instructors, assistive technology, facilities, and equipment.

Many nations have built legislative and legal frameworks to guide special group education. However, People with special needs, on the other hand, have consistently documented dismal results. For example, academic failure of students with hearing impairments is viewed as a long-standing issue in China and Australia that has yet to be resolved amicably (Su et al., 2020). Makewa and Mutie (2018) found that student hearing levels and thresholds, language and communication

impairments, parents' level of education, family socioeconomic situations, and the school environment all affected academic achievement for students with hearing challenges. The situation in Africa is similar, since low academic achievement of students with hearing impairments is documented.

Kenya's new constitution, adopted in 2010, granted learners with disabilities the freedom to enter institutions of learning and facilities. The government has further made considerable efforts to promote fairness in access to education and learning facilities. Building new schools for learners with hearing issues, allocating funding to special schools to acquire equipment and assistive technology, and implementing programs in universities and colleges where this specific group attains skills and knowledge up to masters levels are among the actions adopted (Kalya, 2020; Nyabere & Okello, 2021). Despite these interventions, low academic performance for learners with hearing impairments continues to be reported, even in national tests (Kayla, 2020; McNicholl et al., 2021; Nyabere & Okello, 2021).

Nonetheless, the Kenyan government has increased its efforts to address the issues of academic underperformance among students with hearing impairments. These initiatives involve investments in inclusive school environments as well as the acquisition of assistive devices such as hearing aids through government interventions (Owour et al., 2020; Alshutwi et al., 2020; Desalegn & Worku, 2016; Rishaelly, 2017; Chizingwa, 2018; Bell et al., 2016). Hence, in this article, the performance of learners with hearing challenges is evaluated in terms of their use of listening assistive technology.

Statement of the problem

The Kenyan government has made remarkable efforts to enhance equity of access to education and learning facilities. Particularly, the government has established legislative frameworks and policies to assist children with special needs (Okonji & Ogwezzy, 2019; Masayi, 2020; Johnson, 2021). To further promote all learners' academic accomplishment, the Ministry of Education established a special needs branch, where professionals are hired to educate instructors in universities so as to give learners with special needs quality education. Furthermore, fiscal resources for special needs schools have been provided (Khomera et al., 2021).

Despite the foregoing measures and devotion, the academic performance of primary school students with hearing impairment has been dismal, often falling below the national average of 250 marks in national examinations (Amesi & Yellowe, 2018). This was due to poor infrastructure, insufficient specialist facilities and equipment, insufficient resources for disability mainstreaming and non-inclusivity in primary classes, and a lack of specialized trained instructors. To get higher academic performance, specific facilities and equipment such as listening assistive devices are required. There is scanty literature on the impact of using listening devices on primary school learners with hearing challenges on academics, hence, this investigation.

Purpose of the study

The purpose of this study was to investigate the impact of using listening assistive technology on academic achievement in primary school for learners with hearing impairments in Meru and Tharaka Nithi counties in Kenya.

Hypothesis of the study

HO₀: The use of listening assistive devices does not have a substantial impact on academic achievement in primary schools for students with hearing impairments in Meru and Tharaka Nithi counties.

Literature review

Listening assistive technologies are devices and equipment that amplify, control, and supply sound in order to improve a person's hearing capability, especially when there is background noise (Hermawati & pieri 2019) Individuals with Disability Education Act [IDEA], 2004; National Institute on Deafness and Others Communication Disorders [NIDCD], 2021; Masayi, 2020). They are designed to improve sound quality by reducing background noise, attracting attention, and intelligently delivering the required sound. The severity of the condition determines the type of assistive listening equipment used (Hermawati & pieri, 2019).

Worldwide, the use of listening assistive technology extends beyond making the devices easily available to skilled audiologists and technicians to check the hearing levels and assure the performance of the listening equipment (Zirzor, 2019; Wagner-Skinner, 2018; The American Speech-Language and Hearing Association [ASHA], 2016). The availability of training and instruction enlighten the students and teachers on how to use these gadgets, and also ensure their full exploitation and use (Zirzor, 2019; Wagner-Skinner, 2018).

A learner's hearing loss has several consequences. It has a detrimental influence on the child's language and literacy development, social and emotional development, engagement in frivolous activities, and academic success range

(IDEA, 2004; Wagner-Skinner, 2018). This was effectively demonstrated by the findings of Wager-Skinner (2018), who observed that learners with hearing loss were unable to participate in activities that their peers did. This difference might be reduced by utilizing assistive technology. According to McNicholl et al. (2019), Mwantimwa (2021) and Plan Internationally (2021), the benefits of assistive technology include increased communication abilities, social and psychological pleasure, and improved academic achievement.

The low adoption of assistive technology in Nigeria has been linked to issues such as high cost of obtaining the equipment, and a lack of skilled specialists and teachers to help learners in using the gadgets. Furthermore, there was no clear guideline directing the implementation of assistive devices for students in inclusive settings (Rohwerder, 2018; Tony, 2019). This finding was comparable to that of Ngonyani and Mnyanyi (2021) in Tanzania, who discovered that learners with hearing impairments were offered listening technology, but not in sufficient quantities. It was also determined that the gadgets were not being used to their full potential owing to a shortage of people with the technical skills required to provide assistive technology services such as repairing and maintaining them. Furthermore, the infrequent training for learners and teachers was based on outdated technologies, which did not meet the current demands of the users. The study, however, focused on different types of disability among students at the University of Dar el

Salaam. The context is now focused on assistive listening technologies for hearing impaired students in special elementary schools.

There are few researches in Kenya that investigate the association between the use of assistive technology and academic achievement among hard-of-hearing students. Nonetheless, the significance of assistive technology in achieving strong academic achievement has not been examined; yet numerous studies have focused on the obstacles that contribute to low academic accomplishment for students with diverse impairments, hence this paper was written.

The capability theory

The study was guided by capacity theory which was propounded by Amarta Sen in the 1980s. The theory was later enhanced by linking it to information and communication technology skills. Personal qualities originating from disability. Amarta Sen have an influence on a person's capabilities. The theory articulated an evaluation of disability in Sen's opinion that individual learner capacities and sense functioning strategies such as hearing may be enhanced via the use of information and communication technology. The theory went on to say that the nature of variation in the working skills of learners with impairments necessitated the incorporation of assistive technology to help them navigate their everyday activities. Based on that viewpoint, the argument of this theory appears to suggest that the use of listening assistive technologies and devices to improve learner engagement, involvement, accessibility, and inclusion be considered in order to achieve the desired outcomes such as the rights and equal opportunities for individuals with disabilities.

2.0 Methodology

The research design used in the study was a cross-sectional descriptive survey. Data was gathered from three special public schools in the counties of Meru and Tharaka Nithi, which were purposively selected. A total of 91 students, 13 instructors, and 9 technical support employees were chosen using simple random sampling technique. The 3 school principals and the 2 County Educational Directors for Education were also interviewed. To acquire data, the study employed questionnaires, an interview guide, a focused group discussion, and document

analysis. The researcher delivered the questionnaires to pre-test groups in order to assess the instrument's reliability and validity. Cronbach's Alpha was used to calculate reliability. Data was analyzed using the statistical software for social science (SPSS) version 20, which generated descriptive statistics (frequencies and percentages) and correlation analysis results; while thematic analysis technique was used on qualitative data. The findings were displayed using tables where.

3.0 Results and Discussions

The Cronbach's Alpha coefficient was used to assess the data's reliability. Table 1 displays the results.

Table 1

Reliability result based on the main variables of the study

Main constructs of the study (N = 86)	Cronbach's Alpha
Listening assistive technology (X0)	0.771

As shown in Table 1, the Cronbach's Alpha value was more than 0.7, (0.700). This implied, according to Bryman and Bell (2011), that the data could be utilized in the analysis with confidence.

Response rate

91 of the 91 questionnaires distributed were returned. Five surveys had partial responses and were thus omitted from the study. This resulted in 81 valid surveys, with a response rate of 94.5%. The research sought to interview three head teachers, and all of them (100%) were available for the interview session, as were the two County Directors of

Education, who were also accessible for the interview. The research had invited twenty-two (22) teachers and technical employees to a Focused Group Discussion, but only 18 (81.8%) showed up. As a result, the overall response rate was 94%. The high response rate demonstrates that the researcher's data collection procedures were quite effective.

The study was interested in academic performance, and therefore, it analyzed KCPE results for the last six years (2015 to 2021), apart from 2020 which was exempted because of covid-19 pandemic. A summary of the analysis is shown in Table 2.

Table 2

KCPE Performance of primary schools for learners with hearing challenges in Meru and Tharaka Nith Counties

Year	2015	2016	2017	2018	2019	2021
Njia Primary School - KCPE Mean Scores	177.1	193.5	177.3	149.1	86.7	210.5
Kaaga Primary School - KCPE Mean Scores	201.7	169.5	148.6	138.6	178	159.1
Meru County - KCPE average mean scores	248.7	241.3	244.1	245	242.1	253.5
Kamatungu primary school - KCPE Mean Scores	217.2	219.9	164.14	167.9	167.5	172
Tharaka Nithi County - KCPE average mean scores	252.6	253.7	246.5	256.3	247.5	256.6

The KCPE data shown in Table 4.9 indicates that the academic performance of the three primary schools for learners with hearing impairments has been very low as compared to the county average performance scores for the year 2015, 2016, 2017, 2018, 2019, and 2021. As evidenced by the data, the performance for both Njia and Kaaga Primary Schools has been 165.7 and 165.9 respectively as compared to the Meru County average scores of 245.8; while, the performance for Kamatungu primary school has been slightly higher at 184.8, although low as compared to the Tharaka Nithi County average scores of 252.2. A similar low academic performance was reported in the study by Mwanyuma (2016), where, a mean score of 131, 151 155 was reported in KCPE of 2012 at Kuja, Maseno and Mumias schools for the deaf. The low academic performance of primary schools for learners with hearing impairments noted at Njia, Kaaga and Kamatungu Primary Schools for the last six years is worrying and indicates an urgent need for a remedy. The equality of access to education and related opportunities as stated in the 2010 Kenya Constitution need to be felt by the learners with hearing impairments. The poor academic performance in the three schools was denying opportunities for

education advancement and related benefits to learners with hearing challenges.

Results on Listening Assistive Technology and Academic Performance of Learners

The primary goal was to determine how the use of listening assistive technology improved the academic achievement. The availability of specialist teachers, audiologists, and technical professionals to help learners in the use of the aforementioned assistive technology equipment was also necessary. The use of assistive technology equipment was assessed by posing numerous attitude questions to students who were deaf or hard of hearing. In a focused group discussion, teachers and technical personnel were asked to explore difficulties about listening assistive technology. The principals and county directors of education were questioned about the same topics, and their comments were assessed and integrated into the discussion. The replies were on a 5-point Likert scale, with hearing challenged students needing to indicate their level of agreement with each statement in a table. In SPSS, the ratings for each sentiment was coded as follows: 1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree. These findings are summarized in Table 3.

Table 3

Utilization of Listening Assistive Technology

Sentiments on listening assistive technologies (N = 86)	SD(1)	D(2)	N(3)	A(4)	SA(5)	Mean
• I have enough skills on how to use listening assistive technologies	34 (39.5%)	20 (23.3%)	13 (15.1%)	16 (18.6%)	3 (3.5%)	2.23
• Our school have enough listening assistive devices	7 (8.1%)	40 (46.5%)	14 (16.3%)	17 (19.8%)	8 (9.3%)	2.76
• Our school have variety of listening assistive devices	22 (25.6%)	29 (33.7%)	21 (24.4%)	11 (12.8%)	3 (3.5%)	2.35
• The school has provided the required support to enhance maximum utilization of listening assistive technologies	12 (14.0%)	25 (29.1%)	23 (26.7%)	24 (27.9%)	2 (2.3%)	2.76
• Learners utilize listening assistive devices in class	18 (20.9%)	17 (19.8%)	24 (27.9%)	25 (29.1%)	2 (2.3%)	2.72
• Our school has clear guidelines regarding using of listening assistive	26 (30.2%)	23 (26.7%)	24 (27.9%)	9 (10.5%)	4 (4.7%)	2.33
• Learners utilizing the listening assistive technologies are recognized at our school	22 (25.6%)	29 (33.7%)	21 (24.4%)	11 (12.8%)	3 (3.5%)	2.35
• The listening assistive devices are repaired in timely manner	29 (33.7%)	17 (19.8%)	14 (16.3%)	20 (23.3%)	6 (7.0%)	2.50

Table 2 shows that there was a general high level of disagreement with all of the assertions asked to learners regarding the use of listening assistive technology, with a mean of roughly 2.5. The study concluded that listening assistive devices were insufficient, as observed by 47 (54.6%) of learners with hearing impairment. Only 25 (29.1%) of students rated the device as sufficient, while 14 (16.3%) were ambivalent. Because listening assistive technology devices vary in type, the study attempted to determine if the school has a variety of devices for treating various levels of hearing impairments. According to the findings, 51 (59.3%) of

learners disagreed, 14 (16.3%) agreed, and 11 (12.8%) were neutral.

According to the responses gotten from the teaching and non-teaching staff, head teachers and County Directors of Education through focused group discussion and interviews, the listening assistive technologies expected in primary schools for hearing impaired learners include hearing aids, conciliar implant, tape audiograms, group hearing and loop induction, acoustically treated classes for classes near the roads, audiometers, and radios.

The research also aimed to know if students with hearing impairment were using the few

available listening assistive technology devices in class. Surprisingly, 35 (40.7%) disapproved, while 27 (31.4%) agreed, and 24 (27.9%) were neutral. According to the findings, there were few listening assistive technology devices at the three schools that took part in the survey. The gadgets also lacked variety; indicating that learners who would require certain unique equipment owing to the nature of their hearing issue were suffering or getting little help.

The causes for the poor utilization of listening assistive technology devices in the three schools may be deduced from the findings in Table 2. In the first instance, 54 (62.8%) of learners admitted to lacking sufficient knowledge on how to utilize listening assistive technology. Only 19 (22.1%) had the necessary competencies. According to Rohwerder (2018) and Tony (2019), a lack of expertise in using specialist listening assistive technology devices might be a significant barrier to adoption.

In the second case, the survey discovered that three schools had not provided the necessary assistance to maximize the use of listening assistive technology, as reported by 37 (43.1%) of students with hearing impairment. Another issue was that the three schools did not have clear criteria for utilizing listening aids; 47 (56.9%) disagreed, while 13 (15.2%) responded positively. Perhaps the lack of these criteria influenced how the listening assistive technology devices were maintained. This is because more than half of respondents, 46 (53.5%), disagreed that hearing aids were fixed in a timely way. The presence of technical experts in the school, such as audiologists, speech therapists, and otolaryngologists, was deemed by Zirzor (2019) and Wagner-Skinner (2018) to be a critical in ensuring learners receive immediate assistance and technical expertise when using assistive technologies devices.

According to information gathered from head teachers during interviews, primary schools for learners with hearing challenges provide support by purchasing hearing aid batteries and sometimes providing funds for repairing non-functioning hearing aids, purchasing videos on occasion depending on funds available, and allowing teachers to attend workshops and seminars. The teaching and non-teaching staff also expressed gratitude to the school management for providing computer laboratories, a television room, roomy classrooms, power, a projector, a watch alarm, laptops / computers, internet, photocopier machines, and a phone. They also agreed that the principal ensures that classes are painted on a regular basis, that damaged windows are repaired quickly, and that the blackboard is kept in good condition. Wawire and Namunga (2019) also recognized the significance of obtaining local technical expertise to repair, maintain, and administer assistive technology. However, one principal complained, "*Our school has relatively few hearing aid equipment, therefore we are doing nothing.*" According to County Directors of Education, the government had provided tablets and laptop computers and planned to build acoustically treated classrooms.

The Ministry of Education recognized its responsibility in educating and inducting teachers in the use of assistive technology devices, as well as monitoring their use for quality control and improvement; and in establishing policy guidelines. These findings corroborate those of Soetan et al., (2020), Wawire and Namunga (2019), Kisanga and Kisanga (2020) and Jamali-Phiri et al. (2021). According to these studies,

inclusive and even special education systems require both self-sufficiency and strong support from NGOs, CBOs, international organizations, and the national government in order to eliminate issues of inadequacy, illiteracy, and expertise by facilitating training, acquisition, and maintenance of the necessary technologies. This is because the essential technologies are expensive, while others are not widely available within the country and must be imported. Similarly,

Testing of Hypothesis One

Table 4

Correlations analysis on utilization of hearing assistive technology and the academic performance of learners with hearing impairment

		X1	Y
X1 (listening assistive technologies)	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	86	
Y	Pearson Correlation	.084	1
	Sig. (2-tailed)	.466	
	N	86	86

*. At the 0.05 level, correlation is significant (2-tailed).

The correlation analysis results reported in Table 3 reveal a Pearson correlation value of .084* for the first predictor variable (X1), and a P value greater than 0.05. The P-value indicates that the impact of listening assistive technology on academic achievement of students with hearing impairment is statistically negligible ($r=.084$, $P=.466$). This led to the conclusion that listening assistive devices had a statistically significant

4.0 Conclusion

For students with hearing impairments, the percentage of non-use of listening assistive technology devices was high in elementary schools. The inability to use these gadgets had an impact on the learners' listening and

Rohwerder (2018) advocated developing organizational collaborations, joint trainings, and interventions by government and worldwide organizations in acquiring assistive technology for all types of impairments.

The relationship of the listening assistive technology devices and academic performance in primary schools for learners with hearing challenge was determined using correlation analysis as shown in Table 4.

influence on the academic achievement of pupils in Meru and Tharaka Nithi counties' primary schools for the hearing impaired. Similarly, Ebras (2017) and McNicholl et al. (2019) found a beneficial relationship between secondary school students' use of listening assistive technology and their academic achievement in an inclusive setting scope.

understanding of the material being delivered. This was having a detrimental influence on their academic achievement. This circumstance was impacting the learning environment of students in the

school compound, and had the possibility of affecting their academic achievement. The low usage of listening assistive devices was ascribed to technology inadequacy, a lack of

skills for utilizing them, poor equipment maintenance, and a lack of adequate support from schools, government, the family, and the community.

5.0 Recommendation

This research recommends that the government develops a strategy to acquire all of the necessary listening assistive technology equipment for learners with hearing impairments in all elementary schools. The maintenance of the equipment is also critical. As a result, the Ministry of Education should set aside funds for schools to use in order to fix faulty listening

assistance equipment. Because of the complexity of the various assistive listening devices, it is necessary to instruct users on proper use in order to reduce the rate of breakages and breakdowns. The head teachers should therefore develop training plans for learners and staff on how to use and maintain assistive listening devices.

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