ISSN 2736-0091
E-ISSN 2737-0107

ASSESSMENT OF AWARENESS AND UTILIZATION OF SPEECH-TO-TEXT APPS BY SECONDARY SCHOOL STUDENTS WITH HEARING IMPAIRMENT IN ILORIN METROPOLIS, NIGERIA

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Abstract

Communication between students with hearing impairment and individuals without special need, including parents, teachers, and peers, remains a persistent challenge in Nigerian schools because of the scarcity of professional sign language interpreters. Speech-to-text (STT) applications have been proposed as assistive and instructional tools capable of bridging this gap, yet little is known about how aware secondary school students with hearing impairment in Ilorin metropolis are of such tools, or how frequently they use them. This study assessed the level of awareness and frequency of utilization of STT apps among this population and examined the influence of utilization on academic performance. A descriptive survey design was adopted, and 160 students (40% of a target population of 400) were purposively and randomly selected from Kwara State School for Special Needs, Ilorin. A researcher-designed, validated, and pilot-tested questionnaire (test-retest reliability, r = 0.76) was administered with the assistance of trained teachers. Data were analysed using descriptive statistics and simple linear regression at the 0.05 significance level. Findings showed that both awareness (grand mean = 1.65) and utilization (grand mean = 1.38) of STT apps were significantly low, yet utilization exerted a statistically significant influence on academic performance ($R = 0.46$, $R^2 = 0.21$, $F(1, 158) = 15.40$, $p = .01$). The study recommends deliberate school-based awareness campaigns, improved device access, and supportive institutional policy to help close the gap between the demonstrated value of STT technology and its limited uptake.

Keywords: Speech-to-text apps; Hearing impairment; Awareness; Utilization; Academic performance and Assistive technology

Introduction

Communication between students with hearing impairment and the non-signing hearing population around them, including parents, siblings, teachers, and classmates, remains a critical concern in Nigerian special education, given the acute nationwide shortage of qualified sign language interpreters. Speech-to-text (STT) applications, which convert spoken language into written text in real time, have emerged as one response to this gap, giving students with hearing impairment a channel through which to follow spoken communication without depending solely on an interpreter (Mohammed & Cavus, 2024). Beyond their assistive function, STT apps also serve as instructional tools that support teaching and learning in inclusive classrooms (Bicek & Almali, 2020). Hearing impairment is an umbrella term describing the full spectrum of auditory deficits, from mild loss to profound deafness, and is commonly divided into the "hard of hearing," whose residual hearing remains functional with or without amplification, and the "deaf," who cannot perceive sound at all or only above a very high intensity threshold (Ugbo, 2017). Whatever its degree, hearing impairment can delay the development of speech, language, and cognitive skills, complicating learning and educational progress (Singh et al., 2024). Access to education for this population is further shaped by communication barriers, inadequate accommodations, and social isolation (Matre & Cameron, 2022; UNESCO, 2019), compounded in Nigeria by insufficient funding, inadequate facilities, limited teacher training, and curricula not designed with their needs in mind (Opara, 2020).

Popular STT applications, such as Google Voice, Apple Dictation, Microsoft Speech Recognition, Dragon NaturallySpeaking, and Temi, have documented benefits spanning improved access to auditory information, enhanced classroom participation, greater independence, and stronger literacy outcomes (Birinci, 2021; Kim et al., 2024). Their usefulness, however, is entirely contingent on students having reliable access to compatible

ISSN 2736-0091
E-ISSN 2737-0107

devices (Opara, 2020), and this access is far from guaranteed in the Nigerian context: many secondary schools restrict or outright ban smartphone use during school hours (Ajayi, 2025; Olujobi, 2024), and poverty prevents many families of students with hearing impairment from affording a smartphone, tablet, or laptop in the first place (Amzat, 2010). Since STT apps cannot function independently of such devices (Ekoro et al., 2023), these structural constraints raise a legitimate question about how aware, and how actively engaged, students with hearing impairment in Nigerian secondary schools actually are.

The empirical picture is also unsettled: Muhammed et al. (2019) found speech-to-text among the least-used accommodations, whereas Shadiev and Liu (2022) reported it among the most common. Awareness among stakeholders is considered essential for informed decision-making and resource allocation toward assistive technology (Kim et al., 2024), yet research that jointly examines awareness, utilization, and academic performance among students with hearing impairment in a Nigerian metropolitan setting remains scarce. This study was therefore designed to assess the level of awareness and frequency of utilization of STT apps among secondary school students with hearing impairment in Ilorin metropolis, and to determine whether utilization significantly influences academic performance.

The study is anchored on three complementary theories. Bandura's (1986) Social Cognitive Theory holds that learning is shaped substantially by observation and by cognitive capacities such as symbolization and self-reflection (Bandura, 2009); applied here, it suggests that students with hearing impairment can learn to use STT apps by observing others, and that early successes with the technology build the confidence needed to sustain use. Rose and Meyer's Universal Design for Learning (UDL) framework calls for multiple means of representation, action and expression, and engagement (Camedda et al., 2024; Healy et al., 2023); STT technology aligns naturally with this by offering an alternative channel for text production. Mayer's (2009) Cognitive Theory of Multimedia Learning proposes that learning is most effective when information is presented through both visual and auditory channels; STT apps operationalize this directly for students with hearing impairment by converting auditory input into an accessible visual channel.

Speech-to-text apps, also referred to as dictation or voice-to-text apps, use speech-recognition technology to convert spoken language into written text in real time (Betrand et al., 2023; Mohammed & Cavus, 2024). For students with hearing impairment, they serve a dual role as both assistive technology for communication and an instructional tool that enhances learning (Bicek & Almali, 2020), with documented benefits including improved accessibility to spoken content, enhanced comprehension and note-taking, greater independence, and support for literacy development (Kim et al., 2024). Awareness, students' knowledge and understanding of STT apps and their potential benefits, is a precondition for uptake and is built through institutional sensitization, targeted training, and community outreach (Opara, 2020). Utilization, the actual and sustained use of the technology once awareness exists, remains closely tied to accessibility, and the literature is divided on its extent: Muhammed et al. (2019) found STT apps among the least-used accommodations, while Shadiev and Liu (2022) reported STT among the most commonly used, suggesting that device access and institutional policy may account for much of this variation.

Kambouri et al. (2023), in a five-year study involving thirty children with special educational needs, found that STT use improved both the quantity and quality of written text and significantly raised self-esteem. Matre and Cameron (2022), in a scoping review of thirteen studies on adolescents with learning difficulties, associated STT use with fewer writing errors and better reading comprehension, with students, parents, and teachers generally reporting positive experiences. Huang et al. (2016) found that STT-generated texts improved learning performance and reduced cognitive load, particularly for lower-ability English-language learners. By contrast, Adams (2017), using an experimental design with young children, found no statistically significant improvement in writing cohesion when speech-recognition technology was used instead of paper and pencil. Taken together, the reviewed studies reveal a genuine inconsistency in the literature: most report positive effects of STT use on writing, comprehension, or learning outcomes, while at least one finds no significant benefit. This inconsistency, combined with the acknowledged scarcity of research jointly addressing STT awareness and utilization among students with hearing impairment, particularly within a Nigerian metropolitan setting (Matre & Cameron, 2022), motivated the present study.

ISSN 2736-0091
E-ISSN 2737-0107

Purpose of the Study

Specifically, the study sought to:

1. Determine the level of awareness of speech-to-text apps among secondary school students with hearing impairment in Ilorin metropolis.
2. Determine the frequency of utilization of speech-to-text apps among secondary school students with hearing impairment in Ilorin metropolis.
3. Examine the influence of speech-to-text app utilization on the academic performance of secondary school students with hearing impairment in Ilorin metropolis.

Research Questions

1. What is the level of awareness of speech-to-text apps among secondary school students with hearing impairment in Ilorin metropolis?
2. What is the frequency of speech-to-text app utilization among secondary school students with hearing impairment in Ilorin metropolis?

Research Hypothesis

This hypothesis was formulated and tested at the 0.05 level of significance:

Ho_1: Speech-to-text app utilization has no significant influence on the academic performance of secondary school students with hearing impairment in Ilorin metropolis.

Methodology

The study adopted a descriptive survey research design, an approach suited to collecting and analysing data that describe the characteristics, behaviours, or opinions of a defined population (Dawadi, 2021). The target population comprised approximately 400 students with hearing impairment enrolled at the Kwara State School for Special Needs, Ilorin. A sample of 160 students, representing 40% of the target population, was drawn using a purposive and simple random sampling technique, a proportion exceeding the 35% threshold recommended for reliable representation (Research Advisor, 2006). Data were collected using a researcher-designed instrument, the "Questionnaire on Awareness and Utilization of Speech-to-Text Apps among Students with Hearing Impairment," comprising a demographic section and items assessing awareness and utilization on a modified four-point Likert scale (Strongly Agree/Always to Strongly Disagree/Never). Face and content validity were established by two lecturers specializing in Deaf Education and Educational Technology, whose corrections were incorporated into the final instrument. Reliability was established using the test-retest method with 10 students outside the main sample, correlated using Pearson's Product Moment Correlation Coefficient, yielding a coefficient of $r = 0.76$.

Following permission from the school authority, two trained teachers assisted in administering the questionnaire, with completed copies retrieved immediately. Ethical safeguards included a clear explanation of the study's purpose, voluntary participation with signed consent, and assurance of confidentiality. Demographic data were analysed using frequency counts and percentages. Research questions were answered using item and grand mean scores compared against a criterion mean of 2.50, the midpoint of the four-point scale, with scores below 2.50 interpreted as low and scores at or above 2.50 as high. The hypothesis was tested using simple linear regression at the 0.05 level of significance, with STT app utilization as the predictor and academic performance as the outcome variable.

Results

Research Question 1: What is the level of awareness of speech-to-text apps among secondary school students with hearing impairment in Ilorin metropolis?

Table 1: Mean Scores on the Level of Awareness of Speech-to-Text Apps (Selected Items)

S/N	Item	Mean	Remark
1	I am familiar with speech-to-text apps.	1.53	Low
2	Speech-to-text apps can assist with academic tasks.	1.70	Low

ISSN 2736-0091
E-ISSN 2737-0107

S/N	Item	Mean	Remark
3	I have used speech-to-text apps before.	1.43	Low
4	I know how to access speech-to-text apps on my device.	1.48	Low
5	I would like to learn more about speech-to-text apps.	2.35	Low
6	My teachers/school encourage the use of speech-to-text apps.	1.38	Low
	Grand Mean (10 items)	**1.65**	**Low**

Table 1 shows that respondents disagreed, at varying degrees, with all ten awareness statements. The lowest mean (1.38) concerned teacher/school encouragement of STT apps, while the highest, though still below criterion, was willingness to learn more about the apps (2.35). The grand mean of 1.65 falls below the criterion mean of 2.50, indicating that awareness of speech-to-text apps among secondary school students with hearing impairment in Ilorin metropolis is significantly low.

Research Question 2: What is the frequency of speech-to-text app utilization among secondary school students with hearing impairment in Ilorin metropolis?

Table 2: Mean Scores on the Frequency of Speech-to-Text App Utilization (Selected Items)

S/N	Item	Mean	Remark
1	How often do you use speech-to-text apps for academic tasks?	1.26	Low
2	How often do you rely on speech-to-text apps for communication with teachers/peers?	1.14	Low
3	Do you use speech-to-text apps to complete homework tasks?	1.26	Low
4	How often do you encounter technical issues while using speech-to-text apps?	2.55	High
5	How often do you think speech-to-text apps enhance your learning experience?	1.31	Low
	Grand Mean (10 items)	**1.38**	**Low**

Table 2 shows that most respondents reported never using speech-to-text apps across measured academic activities. The one item exceeding the criterion mean concerned the frequency of encountering technical issues (mean = 2.55), suggesting that on the comparatively rare occasions students do use STT apps, technical difficulties are common. The grand mean of 1.38 is well below the criterion mean of 2.50, indicating that the frequency of STT app utilization among secondary school students with hearing impairment in Ilorin metropolis is significantly low.

Hypothesis Testing

Ho1: Speech-to-text app utilization has no significant influence on the academic performance of secondary school students with hearing impairment in Ilorin metropolis.

Table 3: Summary of Simple Linear Regression Analysis of the Influence of Speech-to-Text App Utilization on Academic Performance

Variable	N	Mean	SD	R	R^2	F	Sig.
STT app utilization	160	23.20	3.32	0.46	0.21	15.40	.01
Academic performance	160	13.92	3.52				

As shown in Table 3, STT app utilization recorded a mean of 23.20 (SD = 3.32) while academic performance recorded a mean of 13.92 (SD = 3.52). The regression coefficient (R = 0.46) indicates a moderate positive relationship between the two variables, with $R^2 = 0.21$ indicating that utilization accounts for approximately 21% of the variance in academic performance. The model was statistically significant, $F(1, 158) = 15.40$, p =

ISSN 2736-0091
E-ISSN 2737-0107

.01, below the 0.05 threshold. The null hypothesis was therefore rejected: speech-to-text app utilization exerted a statistically significant influence on the academic performance of secondary school students with hearing impairment in Ilorin metropolis.

Discussion of the Findings

The finding that awareness of speech-to-text apps is significantly low (grand mean = 1.65) contrasts with Kambouri et al. (2023), who found that students with communication disorders in their sample were generally aware of such technology. This divergence is plausibly linked to structural rather than attitudinal factors: many students with hearing impairment in the study area come from economically disadvantaged households that cannot readily afford smartphones or comparable devices, and several schools maintain restrictive policies on device use during school hours. Where a technology is neither affordable nor institutionally permitted, awareness of it can be expected to lag, regardless of its intrinsic value. Similarly, the significantly low frequency of utilization (grand mean = 1.38) diverges from Matre and Cameron (2022) and Huang et al. (2016), both of whom reported active and generally positive STT use among comparable populations. The most direct explanation is that utilization cannot exceed awareness, and both are constrained by the same access barriers identified above: a student cannot habitually use a tool to which they have little or no exposure, however useful that tool might prove to be if reliably available.

The regression finding that STT utilization significantly influences academic performance, despite low overall awareness and utilization, is a notable result. It runs counter to Adams (2017), who found no significant improvement in writing when speech-recognition technology was used, but is broadly consistent with the wider empirical literature suggesting that, where genuinely available and used, STT technology meaningfully supports the academic engagement of students with hearing impairment. Taken together, these results suggest that the constraint on outcomes for students with hearing impairment in Ilorin metropolis is less about whether speech-to-text apps work and more about whether students actually have the awareness, devices, and institutional support needed to use them. These findings have implications for practice and policy. The demonstrated, if constrained, effectiveness of STT utilization on academic performance suggests that schools serving students with hearing impairment should move beyond ad hoc exposure and adopt deliberate strategies to raise awareness and expand access. Because low awareness and low utilization trace largely to structural barriers, device cost and restrictive school policy, rather than to any deficiency in the technology itself, interventions are likely to be more effective if targeted at these structural constraints than at student attitudes alone. This has direct relevance for policymakers and school administrators responsible for resourcing inclusive education.

Conclusion

This study assessed the awareness and utilization of speech-to-text apps among secondary school students with hearing impairment in Ilorin metropolis and examined the influence of utilization on academic performance. Both awareness and utilization were found to be significantly low, largely attributable to socio-economic constraints and restrictive school device policies rather than to any inherent lack of value in the technology. At the same time, utilization exerted a statistically significant, moderate positive influence on academic performance. Taken together, these findings suggest that where deliberate provision is made to raise awareness and expand access to speech-to-text apps, meaningful gains in the academic performance of students with hearing impairment can reasonably be expected.

Recommendations

1. School administrators should institute deliberate, school-based awareness campaigns on speech-to-text apps for students with hearing impairment, including orientation sessions and demonstrations integrated into the school calendar.
2. Government agencies, NGOs, and philanthropic donors should work toward improving students' access to compatible devices, recognizing that utilization cannot exceed the limits set by device availability.
3. Teachers should be trained to actively integrate and encourage the use of speech-to-text apps within classroom instruction, rather than leaving adoption to individual student initiative.

ISSN 2736-0091
E-ISSN 2737-0107

4. School policies restricting smartphone or device use should be revisited and adapted to permit supervised, purposeful use of assistive technology by students with hearing impairment, alongside clear guidelines to prevent misuse.
5. Future researchers should replicate this study across other locations and with other categories of students with disabilities to test the generalizability of these findings.

References

Adams, C. (2017). *Speech-to-text technology as a writing support for students with learning disabilities: An investigation of the effects on writing quality* [Unpublished doctoral dissertation].

Ajayi, F. (2025). *Oyo state bans mobile phones in schools to enhance discipline, academic excellence*. EduTimes Africa. https://edutimesafrica.com

Ajjawi, R., Tai, J., Boud, D., & Jorre de St Jorre, T. (2022). *Assessment for inclusion in higher education: Promoting equity and social justice in assessment*. Routledge.

Amzat, I. H. (2010). The effect of poverty on education in Nigeria: Obstacles and solutions. *OIDA International Journal of Sustainable Development*, *1*(4), 55–72.

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

Bandura, A. (2009). Social cognitive theory of mass communication. In J. Bryant & M. B. Oliver (Eds.), *Media effects: Advances in theory and research* (3rd ed., pp. 94–124). Routledge.

Betrand, C. U., Ekwealor, O. U., Onyema, C. J., & Duru, A. N. (2023). Speech recognition and transcription for hearing impairments. *Advances in Social Sciences and Management*, *1*(10), 50–61.

Bicek, E., & Almali, M. N. (2020). A mobile application that allows people who do not know sign language to teach hearing impaired people by using speech-to-text procedures. *International Journal of Applied Mathematics, Electronics and Computers*, *8*(1), 27–33.

Birinci, F. G. (2021). The effectiveness of visual materials in teaching vocabulary to deaf students of EFL. *Journal of Language and Linguistic Studies*, *17*(1), 628–645.

Camedda, D., Banks, J., & Ringwood, B. (2024). Empowering diversity: A case study on inclusive assessment and universal design for learning in a post-secondary programme for students with intellectual disabilities. *All Ireland Journal of Teaching and Learning in Higher Education*, *16*(2), 1–22.

Dawadi, S. (2021). Quantitative research design: Descriptive survey research. *Nepal Open University Journal*, *2*(1), 1–8.

Ekoro, E., Ogban, U. E., & Ibe, I. O. (2023). Utilization of information and communication technology in the teaching and learning of computer studies in private and public secondary schools in Cross River State. *Journal of Emerging Technologies*, *10*(9), 944–958.

Healy, R., Banks, J., & Ryder, D. (2023). Universal design for learning policy in tertiary education in Ireland: Are we ready to commit? In J. W. Madaus & L. L. Dukes III (Eds.), *Handbook of higher education and disability* (pp. 377–391). Edward Elgar Publishing.

Huang, Y.-M., Chiu, P.-S., & Liu, T.-C. (2016). The effectiveness of a speech-to-text recognition application on learning performance and cognitive load in English lectures. *Educational Technology & Society*, *19*(3), 1–13.

Kambouri, M., Wilson, T., Stiff, J., Mellor, K., & Pratt, S. (2023). Empowering young writers: A five-year study on the use of speech-to-text technology to support children with special educational needs and disabilities. *Journal of Assistive Technologies*, *17*(1), 25–41.

Kim, H., Hwang, H., Gwak, S., Yoon, J., & Park, K. (2024). Improving communication and promoting social inclusion for hearing-impaired users: Usability evaluation and design recommendations for assistive mobile applications. *PLOS ONE*, *19*(7), Article e0299876.

Matre, M. E., & Cameron, D. L. (2022). A scoping review on the use of speech-to-text technology for adolescents with learning difficulties in secondary education. *Disability and Rehabilitation: Assistive Technology*, *19*(3), 1103–1116. https://doi.org/10.1080/17483107.2022.2149865

Millett, P. (2022). Accuracy of speech-to-text captioning for students who are deaf or hard of hearing. *Journal of Educational, Pediatric & (Re)Habilitative Audiology*, *25*.

Mohammed, H. B. M., & Cavus, N. (2024). Utilization of detection of non-speech sound for sustainable quality of life for deaf and hearing-impaired people: A systematic literature review. *Sustainability*, *16*(20), Article 8976. https://doi.org/10.3390/su16208976

ISSN 2736-0091
E-ISSN 2737-0107

Muhammed, A. H., Kamran, A., Sarwat, I., & Adnan, N. (2019). Supporting deafblind in congregational prayer using speech recognition and vibro-tactile stimuli. *International Journal of Human-Computer Studies*, *123*, 70–96.

Olujobi, B. (2024). *UK joins Nigeria, others with ban on smartphones in schools*. BusinessDay. https://businessday.ng/news/article

Opara, V. C. (2020). Availability, awareness and utilization of assistive technology devices by users with visual, hearing and speech disorder in Rivers State. *Benue Journal of Library, Management and Information Science*.

Research Advisor. (2006). *Sample size table*. The Research Advisor.

Shadiev, R., & Liu, J. (2022). Review of research on applications of speech recognition technology to assist language learning. *ReCALL*, *35*(1), 74–88.

Singh, P., Pareek, D. L., & Das, H. (2024). Understanding hearing impairment: Causes, effects, and interventions. *International Education and Research Journal*, *10*(1), 32–34.

UNESCO. (2019). *Inclusive education for learners with disabilities*. UNESCO Publishing.

Ugbo, F. E. (2017). *Fundamentals of hearing impairment*. Federal College of Education (Special) Press.

World Health Organization. (2020). *Deafness and hearing loss*.