

# ASSESSING ARTIFICIAL INTELLIGENCE AND COMMUNICATION SKILLS OF STUDENTS WITH CONGENITAL HEARING IMPAIRMENT IN FEDERAL UNIVERSITY OF LAFIA, NASARAWA STATE, NIGERIA

Chia, Joseph Terkula<sup>1</sup>, Mansur Surajo<sup>2</sup>, Shamsi Ibrahim, PhD<sup>3</sup> & Ogunmuyiwa Mayomi<sup>4</sup>

<sup>1</sup>*Department of Special Needs Education, Federal University of Lafia*  
[terkulachia@gmail.com](mailto:terkulachia@gmail.com)/+2348064939356

<sup>2</sup>*Department of Special Needs Education, Jigawa State College of Education Gumel*  
[surajo.mansur28@gmail.com](mailto:surajo.mansur28@gmail.com)/+2348037039269

<sup>3</sup>*Department of Special Needs Education, Jigawa State College of Education Gumel*  
[shamsiibrahim87@gmail.com](mailto:shamsiibrahim87@gmail.com)

<sup>4</sup>*Department of Educational Psychology, FCT College of Education, Zuba, Abuja*  
[mayomioguns@gmail.com](mailto:mayomioguns@gmail.com)/+2348022752413

## ARTICLE INFO

**Article No.:** 0231

**Accepted Date:** 16/03/2026

**Published Date:** 30/03/2026

**Type:** Research

## ABSTRACT

This study assessed Artificial Intelligence and Communication Skills of Students with Congenital Hearing Impairment in Federal University of Lafia, Nasarawa State, Nigeria. The study was guided by three objectives. A descriptive survey research design was adopted. The population comprised 43 students with congenital hearing impairment enrolled across various departments in Federal University of Lafia, including Special Needs Education, Library and Information Studies and Social Works. A census sampling technique was employed, involving all 43 students. The instrument for data collection was a structured questionnaire titled "AI and Communication Skills Questionnaire" (ACSQ) which was validated by experts and tested for reliability using Cronbach's Alpha ( $\alpha = 0.84$ ). Data were analyzed using descriptive statistics including frequencies, percentages and mean scores. Findings revealed that learners face significant communication challenges including poor grammatical structure, incorrect tense usage and disjointed sentence construction. AI tools were found to be effective in providing instant grammatical corrections and enhancing language accuracy. AI applications significantly improved overall communication skills by facilitating clearer expression and better interaction with the hearing world. It was recommended among others that the university should establish a Language Support Center staffed by language specialists trained in deaf education to provide weekly small-group tutorials addressing persistent syntactic deficits using instructional materials tailored to the disjointed expression patterns identified in the study.

**Keywords:** Artificial intelligence, communication skills, congenital hearing impairment, grammatical accuracy, higher education

## Introduction

For those who are born naturally deaf, the lack of auditory experiences has a profound impact on their expressive abilities and they frequently struggle with grammatical structures and the subtleties of language, resulting in communication styles that may appear unusual to the hearing world. Hearing impairment especially congenital hearing loss, presents significant challenges for individuals in their ability to communicate effectively (Johnson, 2019). The researchers' interaction with individuals with congenital hearing impairment gathered some of their disjointed phrases or sentences such as "Garri I have not," "You feel it happen me," "I come meet you not," "John go school not now," "I problem have", "What do you told to mother?", "I sent to gift cards MTN 200", "I like Terkula laughing you ideas", "Finish Me TP go your home", "Bassa cost serious pepper and onion serious here", "Battery is low die", "I didn't pay it to repair it to phone", "Food eat you?", among others. Despite their efforts, these expressions reflect a fundamental misunderstanding of English syntax and tense usage as these individuals have never been exposed to the sounds of the language or its grammatical rules.

It is essential to recognize that English is not the first language for many individuals with congenital hearing loss, and their linguistic development is often influenced by their unique experiences and environment. Having never received auditory input, they lack the foundational exposure necessary to grasp the variations of verb conjugation, sentence structure, and tense application (Thompson, et al., 2021). Consequently, individuals with congenital hearing impairment may think they are speaking well even when they are having trouble getting their point across. Unbeknownst to them, their relationships with the hearing world might be severely hampered by grammatical mistakes and inconsistent communication styles.

The poor grammatical structure and organization of speech persist not only among pupils in elementary schools but also among university students. In Federal University of Lafia, students with congenital hearing impairment are enrolled across various departments, including Special Needs Education, Library and Information Studies, Social Works and others. In social interactions, hearing peers who are unfamiliar with sign language often rely on friends with adventitious hearing impairment to interpret messages, as these individuals are generally more proficient in communication. Unfortunately, the poor communication skills of individuals with congenital hearing impairment have further complicated their educational pursuits with few advancing beyond the undergraduate level. Merely knowing and understanding sign language does not guarantee complete comprehension of conversations among individuals with hearing impairment. It often takes a long period to develop understanding and relying on assumptions can lead to inaccuracies.

Fortunately, the advent of artificial intelligence (AI) has to an extent significantly mitigated the communication barriers faced by individuals with congenital hearing impairment in the hearing world. In simple terms, AI is a machine that can perform tasks that typically require human intelligence, such as understanding language, recognizing images and making decisions. Artificial intelligence offers a promising solution to enhance the communication skills of individuals with congenital hearing impairment. Individuals with congenital hearing impairment can get instant feedback on their expressions by using AI technologies intended for language improvement and correction. For example, when a user with congenital hearing impairment inputs a phrase such as "I problem have," "Nadoo go school not now," "what do you told to mother?" an AI system can provide grammatically correct alternatives, like "I have a problem," "Nadoo goes to school now," and "What did you tell your mother?" This capability not only aids in refining their language use but also facilitates better communication with the hearing world. As a result, AI has the potential to bridge the communication gap, enabling individuals with congenital hearing loss to express themselves more clearly and accurately (Nguyen & Patel, 2023). On this basis, the researchers assessed artificial intelligence and

communication skills of students with congenital hearing impairment in Federal University of Lafia, Nasarawa State, Nigeria.

### **Statement of the Problem**

Students with congenital hearing impairment in Federal University of Lafia face significant challenges in communicating effectively in English which is the language of instruction and social interaction in the university environment. Despite their intellectual capabilities and academic potential, many of students with hearing impairment produce disjointed expressions characterized by incorrect grammatical structures, improper tense usage and unconventional sentence construction. These communication difficulties hinder their academic performance, limit their social integration with hearing peers and restrict their participation in university activities to an extent. Although artificial intelligence tools have emerged as potential interventions for language correction and enhancement, there is limited empirical evidence on the effectiveness of AI in improving the communication skills of students with congenital hearing impairment in Nigerian higher education institutions. This study, therefore assessed artificial intelligence and communication skills of students with congenital hearing impairment in Federal University of Lafia, Nasarawa State, Nigeria.

### **Purpose of the Study**

The aim of this study is to assess artificial intelligence and communication skills of students with congenital hearing impairment in Federal University of Lafia, Nasarawa State, Nigeria. The study was guided by the following specific objectives:

1. To examine the communication challenges faced by students with congenital hearing impairment in Federal University of Lafia.
2. To assess the effectiveness of artificial intelligence tools in enhancing the grammatical accuracy of students with congenital hearing impairment.
3. To determine the extent to which artificial intelligence applications improve the overall communication skills of students with congenital hearing impairment.

### **Research Questions**

The following research questions guided the study:

1. What are the communication challenges faced by students with congenital hearing impairment in Federal University of Lafia?
2. How effective are artificial intelligence tools in enhancing the grammatical accuracy of students with congenital hearing impairment?
3. To what extent do artificial intelligence applications improve the overall communication skills of students with congenital hearing impairment?

### **Methodology**

A descriptive survey research design was adopted for this study. This design is appropriate as it enables the systematic collection of data from respondents to describe, analyze, and interpret existing conditions related to the communication challenges and the effectiveness of AI tools among students with congenital hearing impairment. The target population for this study comprised all 43 students with congenital hearing impairment enrolled at Federal University of Lafia. These students are distributed across various departments, including Special Needs Education, Library and Information Studies, Social Works, and other faculties within the university. A census sampling technique was employed, involving all 43 students with congenital hearing impairment at Federal University of Lafia. This technique was adopted because the population size was manageable, allowing for the inclusion of all members in the study. The instrument for data collection was a structured questionnaire titled "AI and

Communication Skills Questionnaire" (ACSQ). The questionnaire was divided into three sections. Section A captured demographic information of respondents, including department, years of study, and ownership of Android or smartphone devices. Section B contained items on communication challenges measured on a four-point Likert scale (Strongly Agree, Agree, Disagree, Strongly Disagree). Section C contained items on the effectiveness of AI tools and applications in enhancing communication skills. To ensure content validity, the initial draft of the questionnaire was subjected to scrutiny by the researcher's supervisor and two experts in Special Needs Education and Applied Linguistics from Federal University of Lafia. Their feedback on the clarity, relevance, and comprehensiveness of the items was incorporated to produce the final valid instrument. The reliability of the instrument was established through a pilot study. The questionnaire was administered to 10 students with hearing impairment at a neighboring university not included in the main study. Data from the pilot were analyzed using Cronbach's Alpha method to determine the internal consistency of the instrument. A reliability coefficient of 0.84 was obtained, which was considered acceptable for the study. The researcher administered the questionnaires directly to the respondents with the assistance of two trained research assistants who were proficient in sign language. The exercise was conducted in a supervised setting to ensure independent responses and a high retrieval rate. Clear instructions were given, and confidentiality was assured. The collected data were analyzed using descriptive statistics. Demographic data were summarized using frequencies and percentages. Likert-scale responses were analyzed using mean scores, with a criterion mean of 2.50 used as the decision rule (mean of 2.50 and above = agreed/effective; below 2.50 = disagreed/ineffective). Results were presented in tables.

## Results

**Table 1: Demographic Characteristics of Respondents**

Variable	Category	Frequency	Percentage (%)
Department	Special Needs Education	35	81.39
	Library and Information Studies	2	4.7
	Social Works	1	2.33
	Other Departments	5	11.63
	Total	43	100
Years of Study	100 Level	7	16.3
	200 Level	15	34.9
	300 Level	13	30.2
	400 Level	8	18.6
	Total	43	100
Android/Smartphone	Yes	41	95.3
	No	2	4.7
	Total	43	100
Type of Smartphone	Android	39	90.7
	iOS (iPhone)	2	4.7
	None	2	4.7
	Total	43	100

Table 1 shows that among the 43 respondents, 81.39% were from the Department of Special Needs Education, 4.7% from Library and Information Science, 2.33% from Social Works and 11.63% from other departments. Regarding years of study, 34.9% were in 200 level, 30.2% in 300 level, 18.6% in 400 level and 16.3% in 100 level. Notably, 95.3% of respondents owned

Android or smartphone devices with 90.7% using Android phones indicating that the vast majority have access to AI-powered applications.

**Research Question 1:** What are the communication challenges faced by students with congenital hearing impairment at Federal University of Lafia?

**Table 2: Mean Summary of Communication Challenges Faced by Students**

S/N	Items	SA	A	D	SD	Mean	Decision
1	I struggle with correct English sentence structure when writing or signing.	20	18	3	2	3.30	Agreed
2	I often use incorrect verb tenses in my expressions.	18	19	4	2	3.23	Agreed
3	People sometimes misunderstand what I am trying to say.	22	16	3	2	3.35	Agreed
4	I find it difficult to construct grammatically correct sentences in English.	15	21	5	2	3.14	Agreed
5	My written communication contains disjointed phrases.	19	17	4	3	3.21	Agreed
6	I feel embarrassed when my expressions are not understood by hearing coursemates.	24	14	3	2	3.40	Agreed
7	I have difficulty with subject-verb agreement in sentences.	16	18	6	3	3.09	Agreed
	<b>Cluster mean</b>					<b>3.25</b>	<b>Agreed</b>

Table 2 above on communication challenges faced by students indicates that all items had mean scores above the criterion mean of 2.50. Item 6 (embarrassment when expressions are not understood) had the highest mean of 3.40, followed by item 3 (misunderstanding by others) with 3.35 and item 1 (struggle with sentence structure) with 3.30. The cluster mean of 3.25 signifies that students with congenital hearing impairment face significant communication challenges including difficulties with sentence structure, verb tenses, subject-verb agreement, and producing disjointed expressions.

**Research Question 2:** How effective are artificial intelligence tools in enhancing the grammatical accuracy of students with congenital hearing impairment?

**Table 3: Mean Summary of Effectiveness of AI Tools in Enhancing Grammatical Accuracy**

S/N	Items	SA	A	D	SD	Mean	Decision
8	AI tools (like Grammarly, ChatGPT) help me correct my grammatical errors.	25	15	2	1	3.49	Effective
9	When I type "I problem have," AI suggests "I have a problem" correctly.	22	17	3	1	3.40	Effective
10	AI applications help me learn the correct verb tenses to use.	18	20	3	2	3.26	Effective
11	Using AI has reduced the number of grammatical mistakes in my writing.	20	18	4	1	3.33	Effective
12	AI tools provide instant feedback on my sentence structure.	24	14	3	2	3.40	Effective
13	I can use AI to check if my sentences make sense before sending messages.	21	17	3	2	3.33	Effective
14	AI has helped me understand the correct word order in English sentences.	17	19	5	2	3.19	Effective
	<b>Cluster Mean</b>					<b>3.34</b>	<b>Effective</b>

Table 3 above on the effectiveness of AI tools in enhancing grammatical accuracy indicates that all items had mean scores above the criterion mean of 2.50. Item 8 (AI helps correct grammatical errors) had the highest mean of 3.49, followed by items 10 and 12 with 3.40 each. The cluster mean of 3.34 confirms that AI tools are effective in enhancing grammatical accuracy among students with congenital hearing impairment by providing instant feedback, correcting errors, and helping with verb tenses and word order.

**Research Question 3:** To what extent do artificial intelligence applications improve the overall communication skills of students with congenital hearing impairment?

**Table 4: Mean Summary of Extent AI Applications Improve Overall Communication Skills**

S/N	Items	SA	A	D	SD	Mean	Decision
15	AI has improved my ability to communicate clearly with hearing peers.	23	16	3	1	3.42	Great Extent
16	I feel more confident expressing myself since using AI tools.	21	18	3	1	3.37	Great Extent
17	AI helps me organize my thoughts before writing or signing.	19	19	4	1	3.30	Great Extent
18	Using AI has reduced the frequency of misunderstandings in my conversations.	20	17	4	2	3.28	Great Extent
19	AI applications help me learn new vocabulary and proper usage.	18	20	3	2	3.26	Great Extent
20	I am able to participate more actively in academic discussions with AI support.	16	21	4	2	3.19	Great Extent
21	AI tools have helped me write better assignments and examination answers.	22	16	3	2	3.35	Great Extent
<b>Cluster Mean</b>						<b>3.31</b>	<b>Great Extent</b>

Table 4 above on the extent to which AI applications improve overall communication skills indicates that all items had mean scores above the criterion mean of 2.50. Item 15 (improved ability to communicate clearly with hearing peers) had the highest mean of 3.42, followed by item 16 (increased confidence) with 3.37 and item 21 (better assignments and examination answers) with 3.35. The cluster mean of 3.31 confirms that AI applications improve the overall communication skills of students with congenital hearing impairment to a great extent.

### Discussion of Findings

The findings revealed that students with congenital hearing impairment in Federal University of Lafia experience significant and persistent communication challenges, particularly in grammatical domains such as sentence structure, verb tense usage and subject-verb agreement. These difficulties manifest in disjointed expressions such as "I problem have" and "Food eat you," which reflect non-standard syntactic ordering characteristic of individuals who lack early auditory exposure to language models. The findings is consistent with Johnson (2019) who observed that individuals born with hearing loss often struggle with grammatical structures because they have never been exposed to the sounds of the language. Thompson, et al. (2021) reported that without foundational auditory input, individuals with congenital hearing impairment lack the exposure necessary to grasp verb conjugation, sentence structure and tense application. However, a critical analysis of these findings moves beyond mere corroboration. Prior studies emphasize the role of early auditory deprivation, the present findings add a crucial dimension: these challenges persist despite years of formal education, including university enrollment. This persistence invites a deeper explanation. Drawing on Kral and O'Donoghue (2019), congenital hearing loss causes neurobiological changes in the brain

during critical developmental windows, resulting in lasting syntactic processing deficits that even visual language acquisition cannot fully overcome. This challenges the assumption that communication difficulties naturally resolve with age or education. The persistence of these challenges across all levels of study in the present data suggests that university education alone does not remediate these deficits. Unlike studies showing gradual improvement among deaf students in higher education, this study found no such progression, likely due to differences in institutional support. The authors conclude that persistent challenges are not inevitable but indicate the need for sustained, targeted syntactic intervention rather than reliance on incidental learning through mainstream coursework.

The findings demonstrated that AI tools are perceived by respondents as highly effective in enhancing grammatical accuracy, particularly in providing instant feedback, assisting with verb tenses and helping with correct word order. The findings align with Nguyen and Patel (2023) and Smith and Adeyemi (2024) who stated that AI tools provide instant feedback and improve grammatical accuracy among deaf students. However, a critical reading requires methodological caution. Moreover, Cavender and Ladner (2018) caution against uncritical adoption, noting that over-reliance on AI may lead to technological dependency rather than durable linguistic competence. This raises the question of whether AI use supports lasting language development or functions only as a prosthetic tool. Additionally, while smartphone ownership and AI tool usage were high, Fenwick (2023) argued that in sub-Saharan African universities, access often outpaces digital literacy and pedagogical integration—a phenomenon termed "access without integration." High usage rates may not translate into effective learning if tools are used superficially. Thus, the present findings indicate potential rather than definitive effectiveness.

The findings reveal that AI applications are perceived to improve overall communication skills, with notable enhancements in clarity with hearing peers, increased confidence, and reduced misunderstandings. The finding is consistent with Okonkwo and Eze (2023) and Nguyen and Patel (2023) who found that AI-assisted tools improve social interaction, academic participation, and bridge communication gaps for students with hearing impairment. However, a critical analysis distinguishes perceived social benefit from measurable communicative competence. While increased confidence and reduced anxiety are valuable, they do not equate to enhanced competence without AI support. Drawing on Fenwick (2023), smartphone ownership enables access but does not guarantee effective integration, as the study did not measure formal training, lecturer incorporation or institutional support. Notably, unlike previous studies, the present findings suggest benefits extend to informal social communication with hearing peers—a noteworthy contribution given social isolation challenges.

The findings presented reflect self-reported perceptions rather than objective measures of communication competence, grammatical accuracy or academic performance. The positive perceptions reported were influenced by participant enthusiasm for technology or a desire to present favourable views of AI tools. Additionally, the cross-sectional design captures perceptions at a single point in time, precluding conclusions about the sustainability or long-term developmental impact of AI tool use. Unlike experimental or quasi-experimental designs that could measure pre- and post-intervention grammatical accuracy, this study provides insights into attitudes and perceived effectiveness. The authors caution against overgeneralizing the findings to claim that AI tools definitively improve grammatical accuracy or communication skills. Rather, the findings indicate that students perceive these tools as highly useful and this perception is an important starting point for future research. To build on these findings, future studies should employ mixed methods, including pre- and post-tests of grammatical accuracy, observational studies of AI tool use and in-depth interviews to explore how students engage with AI feedback. Additionally, comparative studies between students

who receive formal training in AI tool use and those who do not would help clarify the conditions under which AI tools contribute to sustainable language development.

### **Conclusion**

This study assessed artificial intelligence and communication skills of students with congenital hearing impairment in Federal University of Lafia, Nasarawa State, Nigeria. The findings revealed that students face significant communication challenges characterized by difficulties with grammatical structure, verb tense usage, and disjointed expressions. Artificial intelligence tools were found to be effective in enhancing grammatical accuracy by providing instant feedback and correcting errors. Furthermore, AI applications improved overall communication skills to a great extent, enabling clearer expression, increased confidence, and better academic performance. The study concludes that AI serves as a valuable intervention for improving communication outcomes among students with congenital hearing impairment in higher education.

### **Recommendations**

Based on the three findings of this study, the following recommendations are made:

1. The university should establish a Language Support Center staffed by language specialists trained in deaf education to provide weekly small-group tutorials addressing persistent syntactic deficits using instructional materials tailored to the disjointed expression patterns identified in the study.
2. The university should integrate AI-powered language tools into formal academic support by procuring premium subscriptions for all registered students with hearing impairment, installing AI applications on designated computer laboratories and incorporating a mandatory AI literacy module into orientation programmes for newly admitted students.
3. The Center for Disability Studies should conduct quarterly training workshops where language specialists teach students to analyze AI corrections to understand grammatical rules, while ICT personnel provide hands-on instruction on using AI tools for drafting academic work and written communication with attendance tracked and certificates awarded to incentivize engagement.

## References

- Cavender, A. & Ladner, R. E. (2018). The deaf academic perspective on AI-mediated communication. *In Proceedings of the 20th International ACM SIGACCESS Conference on Computers and Accessibility* (pp. 1-5).
- Fenwick, A. (2023). Digital access and disability inclusion in sub-Saharan African universities. *International Journal of Inclusive Education*, 27(4), 512–528.
- Johnson, A. (2019). Language development in children with congenital hearing loss: Challenges in syntax and grammatical structure. *Journal of Deaf Studies and Deaf Education*, 24(3), 215–228.
- Kral, A. & O'Donoghue, G. M. (2019). Profound deafness in childhood. *New England Journal of Medicine*, 381(15), 1438–1450.
- Nguyen, H. & Patel, R. (2023). Empowering the deaf community through AI: A study on communication enhancement. *International Journal of AI and Education*, 10(4), 234-250.
- Nguyen, T. & Patel, S. (2023). Artificial intelligence and language correction: Bridging communication gaps for individuals with hearing impairment. *Assistive Technology Journal*, 35(4), 289–301.
- Okonkwo, C. & Eze, M. (2023). AI-assisted communication tools and social interaction of students with hearing impairment in Nigerian tertiary institutions. *West African Journal of Education*, 43(2), 78–92.
- Smith, A. & Adeyemi, B. (2024). AI-powered writing assistants and grammatical accuracy among deaf university students in Nigeria. *Nigerian Journal of Special Education*, 12(1), 45–58.
- Thompson, L., Williams, K. & Davis, R. (2021). Foundational auditory exposure and its impact on verb conjugation and sentence structure in congenitally deaf individuals. *American Annals of the Deaf*, 166(2), 112–128.