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Assessment Strategies for Students with Hearing Impairments in an Inclusive TVET Tertiary Institution in Ghana

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ABSTRACT

Hearing impairment poses significant challenges to students' academic performances in tertiary institutions, particularly where assessment practices rely predominantly on written language. These challenges are most pronounced in inclusive educational environments, where uniform assessment methods often fail to address the specific needs of students with hearing impairments. A qualitative research design was used to examine the assessment strategies used by lecturers to support students with hearing impairments in a Technical and Vocational Education and Training (TVET) institution in Ghana. Using a census sampling approach, the study involved 20 students with hearing impairments and 10 lecturers of the Takoradi Technical University who participated in semi-structured interviews. The findings revealed that, despite institutional commitments to inclusive education, written examinations remain the dominant and often the sole form of assessment. As a result, few adaptations are made to accommodate the linguistic and communicative needs of hearing-impaired students. This heavy reliance on written assessments disadvantages these students, as differences in language structure and writing conventions impede their ability to interpret questions and articulate responses effectively, leading to unfavourable outcomes. It was concluded that inclusive assessment practices in TVET institutions remain limited in scope and unevenly implemented. It was recommended that the TVET Disability Policy should be fully operationalised. Disability support desks should be institutionalised across faculties; accessible assessment formats should be adopted.

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Additionally, examination questions should be designed using clear, concise, and straightforward language. These targeted reforms are essential to promoting fairness, equity, and academic success for students with hearing impairments in inclusive tertiary education settings.

Keywords: Assessment Strategies; Hearing Impairment; Inclusive Education; Tertiary Institutions; TVET

1. Introduction

Assessment is a crucial component of education, guiding students' learning and development[1]. It provides feedback on progress, identifies strengths and weaknesses, and informs adjustments to improve performance[2]. Through assessment, students gain a clearer understanding of their knowledge and skills, fostering self-reflection and motivation. It also helps educators tailor instruction to meet individual needs, ensuring more effective learning experiences[3]. Hearing impairment presents significant challenges to students in tertiary institutions, especially where assessments rely heavily on written language[4]. Research shows that students with hearing impairments often struggle with language acquisition, reading comprehension, and written expression – skills essential for academic success. Because instruction and assessment in higher education are largely text-based, these students may face difficulties processing complex academic language, leading to performance disparities compared to their hearing peers[5].

Furthermore, hearing-impaired students often encounter barriers to accessing lectures, discussions, and learning materials, limiting comprehension and retention of key concepts[6]. Without adequate support, such as captioning services, sign language interpreters, or alternative assessment methods, hearing-impaired students are disadvantaged in demonstrating their academic potential. Inclusive assessment strategies, including the use of visual aids, alternative testing formats, and assistive technologies, are, therefore, essential to ensure equity and accessibility[7]. Institutions must also implement policies that promote accessibility and ensure that students with hearing impairments receive the necessary support to succeed in higher education.

In Ghana, most studies on inclusive education focus on primary and secondary levels[7], with limited research on tertiary institutions and their assessment practices for students with hearing impairments. Existing studies by Agbenyega et al.[2], and Mantey et al.[8] have emphasised general accessibility issues rather than the effectiveness of inclusive assessment strategies[9]. There is also limited evidence on whether lecturers receive adequate training in inclusive assessment or if students with hearing impairments have access to alternative evaluation methods.

The primary objective of this study was to examine the academic assessment strategies employed by lecturers for students with hearing impairments in an inclusive TVET institution in Ghana. Specifically, the study aimed to:

1. Identify the assessment strategies currently used by lecturers for students with hearing impairments at the Takoradi Technical University.
2. Examine the challenges students with hearing impairments face in assessment processes at the Takoradi Technical University.

This study aims to investigate the academic assessment strategies employed by lecturers for students with hearing impairments in inclusive environments like TVET institutions in Ghana. It seeks to explore the extent to which these strategies accommodate the unique learning needs of hearing-impaired students and identify challenges they face during assessments. Additionally, the study aims to evaluate lecturers' preparedness and institutional support in implementing inclusive assessment practices. Ultimately, the research will propose effective and equitable assessment strategies that enhance accessibility and improve the academic performance of students with hearing impairments at TVET institutions.

2. Literature Review

2.1. Assessment Strategies

Assessment plays a critical role in education, serving as a tool to measure students' learning progress, provide feedback, and guide instructional decisions[2]. Various assessment methods exist, each with its strengths and limitations, particularly in inclusive learning environments where students have diverse needs. This section contains a review of

key assessment methods and their implications for students, with a focus on inclusive education.

Traditional assessment methods, including written examinations, multiple-choice tests, and essays, remain the most commonly used forms of evaluation in higher education[5]. These methods aim to test students' knowledge retention, critical thinking and problem-solving abilities. However, for students with hearing impairments, traditional assessments can present challenges, particularly when these assessments rely heavily on language proficiency. Research by Khalid et al.[10] highlights that students with hearing impairments may struggle with complex written instructions and academic vocabulary, which can negatively impact their performance.

To address the limitations of traditional assessments, Chifinda et al.[11] proposed four alternative and inclusive assessment methods that cater to diverse learning needs. Portfolio assessment, the first of the four, allows students to have an omnibus of their works over time, demonstrating progress and mastery of skills[1]. Portfolio assessment provides flexibility and enables students with hearing impairments to showcase their abilities in different formats, reducing the linguistic barriers associated with written examinations. Project-based assessment involves evaluating students through practical, real-world tasks and collaborative projects[4]. It allows students to demonstrate understanding through hands-on activities, presentations and visual representations, making it more accessible to hearing-impaired students. Oral and sign language-based assessments, according to Agbenyega et al.[2], incorporates sign language or visual aids in enhancing accessibility for students with hearing impairments. Providing sign language interpreters or video-recorded responses ensures that students can effectively communicate their knowledge.

The effectiveness of inclusive assessment methods largely depends on lecturers' awareness and preparedness to implement them. Studies indicate that many educators lack adequate training in designing and administering assessments that accommodate students with disabilities[8]. In Ghana, research by Alhassan et al.[4] reveals that while policies promote inclusive education, implementation gaps exist, particularly in higher education institutions. Limited access to assistive technologies, insufficient lecturer training and lack of alternative assessment guidelines remain significant challenges. Tertiary institutions primarily rely on written examinations and coursework assessments, with little emphasis on inclusive practices for students with disabilities[2]. At an institution like the Takoradi Technical University, anecdotal evidence suggests that while efforts have been made to support students with hearing impairments, assessment strategies remain largely conventional. The absence of structured policies on alternative assessment approaches has been identified as a gap in the country's higher education sector.

2.2. HI Students Assessment Challenges

Students with hearing impairments face unique challenges in academic assessment, particularly in higher education settings where traditional evaluation methods often rely on spoken and written language. These challenges stem from linguistic barriers, limited accessibility and inadequate institutional support, which can significantly impact their academic performances[11]. One of the primary challenges hearing-impaired students face is the difficulty in comprehending and responding to written assessments. Many students with hearing impairments use sign language as their primary mode of communication, which differs structurally from written and spoken languages[10]. In Ghana, there is no codified Ghanaian Sign Language, and this undesirable situation has resulted in communication breakdowns during signing, making it challenging for students to express themselves clearly in written assessments[2]. This often results in lower scores, not due to a lack of knowledge but due to difficulties in language processing and expression.

Hearing-impaired students often require accommodations such as sign language interpreters, captioned materials and alternative test formats to effectively participate in assessments[9]. However, studies have shown that many higher education institutions lack these essential resources, leaving students at a disadvantage[11]. In Ghana, tertiary institutions, including the Takoradi Technical University, face logistical and financial constraints in providing such accommodations, further exacerbating the challenges faced by students with hearing impairments.

Oral presentations, listening comprehension tests and verbal participation are common assessment methods in higher education, yet they pose significant challenges for students with hearing impairments. Research by Jeptepkeny et al.[12] indicates that when assessments require auditory com-

prehension, students with hearing impairments may struggle to access key information. Instructors who fail to provide transcripts, sign language support or alternative assessment formats inadvertently create barriers that affect the hearing-impaired students' performances.

The effectiveness of assessment strategies for hearing-impaired students depends largely on lecturers' ability to implement inclusive practices. However, studies suggest that many lecturers lack adequate training in designing assessments that accommodate students with disabilities[12]. In Ghana, Agbenyega et al.[2] found that although inclusive education policies exist, their implementation remains weak due to limited professional development programmes for lecturers. This knowledge gap results in the continued reliance on traditional assessment methods, which do not cater to the needs of hearing-impaired students.

Hearing-impaired students often experience psychological and social challenges that further affect their performance in examinations. Feelings of isolation, anxiety and low self-esteem can arise when students are unable to fully participate in academic activities[13]. In assessment settings, the fear of misinterpreting instructions or failing due to communication barriers can increase stress levels, potentially affecting performance. A study by Agbenyega et al.[2] on Ghanaian higher education institutions highlighted that students with disabilities, including hearing impairments, often feel excluded due to the lack of awareness and support from faculty and peers.

Institutional policies play a crucial role in shaping inclusive assessment practices. However, in many Ghanaian tertiary institutions, inclusive education policies are either poorly implemented or non-existent[14]. Without clear guidelines on how to assess students with hearing impairments, lecturers often resort to traditional methods, unintentionally disadvantaging these students. The lack of institutional commitment to inclusive assessment further limits the opportunities for hearing-impaired students to demonstrate their true academic potential.

2.3. Conceptual Framework

This study adopts a conceptual framework that situates the interaction between teachers and HI students within broader debates on inclusive education and accessibility. **Figure 1** maps the communication flow between teachers and HI students, highlighting assessment-related barriers and feedback loops. The oval shapes represent the participants (teachers and HI students), while the arrows indicate bidirectional feedback: teachers adjust instructional practices based on student responses, while students depend on feedback to close learning gaps. While this framework captures the immediate classroom dynamics, it is expanded by drawing on Universal Design for Learning (UDL) and inclusive assessment models. UDL emphasises flexible approaches to teaching, learning and assessment that anticipate learner diversity rather than reacting to it[10]. In this context, UDL principles such as multiple means of representation, expression and engagement provide a useful lens for analysing how assessment practices can be adapted to meet the needs of HI students. For example, simplifying examination tasks, using visual and diagrammatic support or incorporating signed videos align with UDL strategies that make content accessible to diverse learners.

Similarly, recent scholarship on inclusive assessment[10] highlights the need to move beyond integration, where HI students simply take the same assessments as their hearing peers, toward inclusion, where assessment is designed to validly capture their knowledge and skills. International debates increasingly emphasise equity of access to assessment[15] and the risks of "construct-irrelevant barriers," such as linguistic complexity, that unfairly disadvantage HI learners. Against this background, the communication challenges identified in Ghanaian TVET institutions limited vocabulary in English, underdeveloped Ghanaian Sign Language, teachers' low signing competence and lack of subject-specific glossaries – can be viewed as systemic barriers that prevent the realisation of inclusive assessment. Köhler et al.[16] indicated that these barriers resonate with findings across Sub-Saharan Africa and globally, where language mismatches and resource constraints encumber the implementation of UDL-based assessment models.

Accordingly, the conceptual framework integrates both local realities (teacher-student communication gaps and institutional resource limitations) and global perspectives (UDL and inclusive assessment principles). It emphasises four interrelated needs that must be addressed to achieve equitable assessment for HI students: language proficiency (strengthening both English literacy and codified sign language vocabulary), teacher competence (improving communication and

inclusive assessment training), accessible resources (providing visual, signed and multimodal assessment tools) and institutional support (reducing reliance on improvisation through policy and systemic reforms). This blended framework positions the study not only within the Ghanaian context but also within broader international debates on inclusive and accessible assessment, ensuring that the findings speak to both local practice and global scholarship.

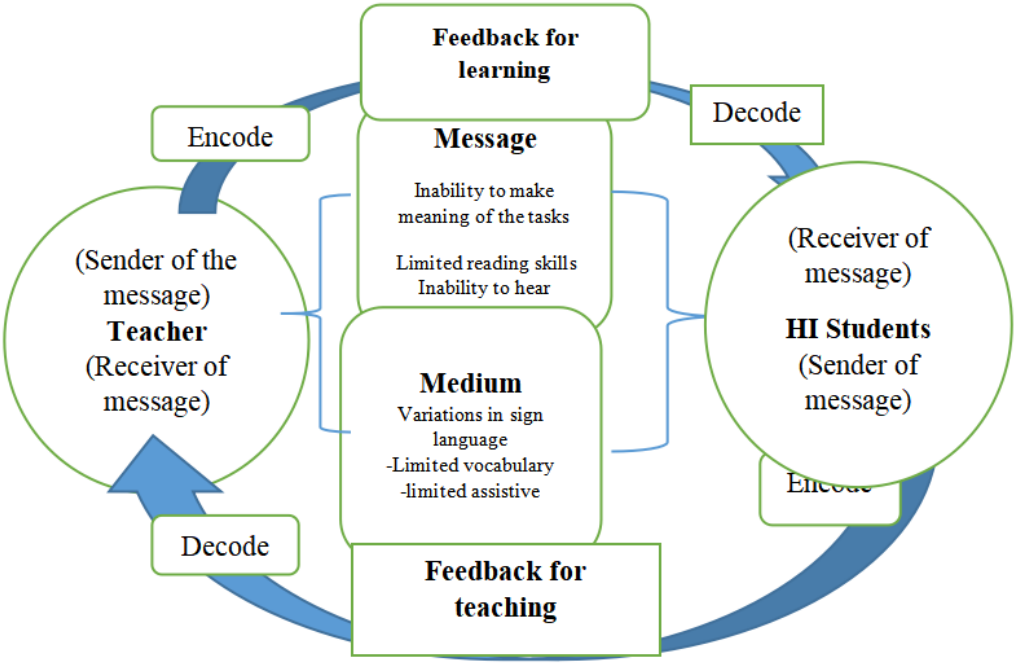

Figure 1. Communication flow between the HI students and the teachers and barriers in the process [12].

3. Methods

3.1. Research Context

Established in April 1954 as a Government Technical Institute, the Takoradi Technical University (TTU) has undergone significant transformation over the decades. In accordance with the Technical University Act, 2016 (Act 922), which mandated the conversion of eligible polytechnics into technical universities, the Takoradi Polytechnic met the necessary criteria and was formally granted technical university status. Following this, the institution officially adopted the name *Takoradi Technical University*. Today, TTU offers a wide range of academic programmes tailored to meet the evolving needs of industry and society. These include two-year Master of Technology (M.Tech.) degrees, four-year and two-year (top-up) Bachelor of Technology (B.Tech.) programmes, three-year Higher National Diplomas (HND), two-year Diplomas of Technology and various non-tertiary programmes. As part of its commitment to inclusive education, the University established the Disability Support and Services Unit – a dedicated body that provides academic and social support to students with disabilities and physical challenges. Since 2017, TTU has admitted a total of 192 students with disabilities into various degree and diploma programmes, reflecting its ongoing efforts to promote access and equity in higher education.

3.2. Research Design

Phenomenology was adopted to explore the lived experiences of the lecturers and the hearing-impaired students. This approach was suitable because the researchers wanted to thoroughly understand the rationale behind the assessment strategies currently used by lecturers for students with hearing impairments at TTU and to examine the challenges students with hearing impairments face in assessment processes at TTU [17]. This design makes it possible to capture the complex interplay between institutional policies, lecturer practices and student outcomes. It provides a platform for multiple voices, both lecturers and students, to be heard,

while also integrating documentary evidence such as examination scripts.

This study adopted a census approach to ensure complete coverage of the target population, which included all students with documented hearing impairments enrolled at the TTU and all lecturers who had taught or assessed the students during the study period. The census framework was based on official institutional records obtained from the Disability Support and Services Unit and departmental registers. This approach enabled the researchers to identify and include every member of the defined population, thereby eliminating the potential for sampling bias and ensuring that all relevant perspectives were captured.

The inclusion criteria for student participants were as follows: they had to be registered students of the institution during the data collection period, be verified as hearing impaired, as recorded in the Disability Support and Services Unit database and be enrolled in a TVET or technical programme where academic assessments were administered. Students also needed to provide informed consent to participate in the study. For the lecturers, eligibility required active employment at TTU, direct involvement in teaching or assessing students with hearing impairments and consent to participate in the research. Individuals who did not meet these criteria, who were unavailable during the data collection phase or who declined participation were excluded from the study.

To recruit participants, the researchers collaborated with the Disability Support and Services Unit and departmental heads to compile a comprehensive list of all eligible students and lecturers. Potential participants were contacted through institutional emails, phone calls and in-person briefings. Each participant received an information sheet explaining the purpose of the study, its procedures and their rights, including the voluntary nature of participation and the option to withdraw at any time without penalty. Follow-up communication was conducted to maximise participation and to ensure clarity regarding consent and scheduling. Ultimately, all consenting members of the identified population were included, resulting in a total of 30 participants, 20 students with hearing impairments and 10 lecturers.

Because the census approach sought to include the entire accessible population rather than a statistical subset, the findings are representative of the local institutional context rather than the wider national population. This method was particularly appropriate given the small size of the population and the study's focus on a detailed, qualitative understanding of inclusive assessment practices. However, it also means that the results should be interpreted with caution when generalising to other contexts or institutions.

Non-response occurred only in a few instances, primarily due to unavailability or withdrawal after initial consent. Such cases were documented, and basic demographic information, when ethically permissible, was retained to evaluate whether non-respondents differed significantly from respondents. Overall, the comprehensive coverage achieved through the census approach enhanced the validity and reliability of the study's findings by ensuring that the voices of all hearing-impaired students and their lecturers were adequately represented.

3.3. Instruments

Data were collected through semi-structured interviews and observation, which are core methods in qualitative inquiry[18]. To mitigate researcher bias, briefing sessions were conducted prior to the interviews to allow the participants to familiarise themselves with the key themes, thereby enhancing trustworthiness and minimising undue influence.

3.4. Procedure and Data Collection

The data for the study were collected from multiple sources, including semi-structured interviews and examination scripts. The data were collected through researchers' and in-depth interviews with 10 lecturers and 20 students. The researchers prepared an interview protocol to be used as a guide. It was made up of semi-structured questions validated by some teachers and experts in inclusive education. Each interview with the lecturers lasted about thirty-five minutes. All the teachers' interviews were recorded and transcribed. The transcripts were then analysed manually for recurring themes. The in-depth interviews allowed participants to express themselves freely about the phenomenon under study and also aided the researchers in asking open-ended questions that required follow-up questions. This also allowed participants to provide information that was relevant to the study. Interview and observation data were fully transcribed and subjected to meticulous analysis. Each transcript was read

repeatedly to ensure familiarity and depth of understanding.

3.5. Triangulation of Data Sources

To enhance the credibility, validity and traceability of findings, triangulation was conducted using three complementary data sources: semi-structured interviews, classroom and assessment observations, and document analysis of students' examination and assignment scripts. 30 interviews were analysed, comprising 20 students with hearing impairments and 10 lecturers, alongside six classroom observations and a review of 40 student scripts (20 examination papers and 20 assignments). These diverse sources provided a holistic understanding of both the challenges and effective practices related to assessment in inclusive TVET settings.

The triangulation process focused on three key analytical categories derived from the literature and preliminary coding: comprehension of instructions, accuracy and coherence of written responses, and evidence of sign language interference in syntax. Each student script was examined for indications of these features using a binary coding scheme, whereby a value of "1" was assigned if evidence of a particular feature was present and "0" if absent. Percentages were calculated based on the frequency of "1" codes across the total number of scripts (n = 40). This approach ensured transparency in how qualitative observations were quantified and allowed for consistent interpretation across multiple data sources.

The analysis revealed that 34 of the 40 scripts, representing 85 percent, showed signs of limited comprehension of complex instructions, while 28 scripts, or 70 percent, exhibited varying degrees of Ghanaian Sign Language (GSL) interference in syntax. In contrast, 16 scripts, or 40 percent, demonstrated improvement in tasks that included visual cues, demonstrations, or simplified language, indicating that accessible pedagogical adjustments can positively influence student performance.

Cross-validation of findings across interviews, observations, and script analyses confirmed that the challenges described by both lecturers and students were also evident in students' written work and classroom behaviour. Notably, lecturers who incorporated visual aids, step-by-step task demonstrations, or simplified language in assessments reported more consistent understanding and engagement among HI students. These effective practices, though not yet standardised, represent promising examples of context-sensitive inclusive strategies within Takoradi Technical University.

3.6. Data Analysis Techniques

All audio-recorded interviews were transcribed verbatim and analysed using a six-phase framework for thematic analysis [9], which provides a structured yet flexible process for identifying and interpreting patterns within qualitative data. The researchers first familiarised themselves with the data by reading and re-reading transcripts, followed by manual coding using Microsoft Word for annotation and Excel for organising and comparing codes.

Initial codes were generated to capture meaningful units of information and then grouped into broader themes reflecting recurring ideas and relationships. To enhance reliability, six transcripts (approximately 20% of the dataset) were double-coded independently by a second researcher experienced in qualitative methods. Coding discrepancies were resolved through consensus discussions, and, where disagreements persisted, a senior researcher mediated to reach a final agreement. The resulting codebook was refined and applied consistently to all transcripts.

Themes were reviewed for coherence and representativeness against the full dataset, then defined, named and supported by illustrative quotes. This process ensured that the findings accurately reflected participants' perspectives while maintaining analytical transparency and rigour. The combined use of manual methods and simple digital tools (Word and Excel) enabled systematic tracking, verification and synthesis of data across all participants.

To enhance trustworthiness, Mantey et al. [8] indicate several strategies were integrated throughout the analysis:

Credibility: Member checking was conducted by sharing preliminary interpretations with selected lecturers and students with hearing impairment (HI) to ensure their perspectives were accurately captured. In addition, peer debriefing with two colleagues experienced in qualitative research and inclusive education provided external critique of the coding framework and emerging themes.

Dependability: An audit trail was maintained in the form of coding logs and thematic development records, documenting analytical decisions and providing transparency in the research process.

Confirmability: Double coding was performed on a

subset of transcripts by an independent researcher. Differences in coding were discussed until consensus was reached, thereby reducing individual bias and enhancing neutrality.

Transferability: Thick descriptions of participants' experiences and contextual details were provided in the findings, enabling readers to judge the applicability of results to other settings.

Through this rigorous and transparent process, the analysis ensured that the findings were firmly grounded in the data, methodologically sound and trustworthy.

3.7. Ethical Considerations

The study was conducted in accordance with internationally recognised ethical standards for educational research and adhered to the ethical guidelines of TTU. Ethical approval was granted by the Takoradi Technical University Research and Ethics Committee under approval number TTU/REC/EDU/024/2024. The Committee reviewed the research design, participant recruitment process, consent procedures and data protection measures before authorising data collection. Before participation, all potential participants received a detailed information sheet explaining the purpose of the study, the research procedures, possible risks and benefits and their rights as participants. Each participant was given adequate time to review the information and to ask questions before signing an informed consent form. The consent process emphasised the voluntary nature of participation, ensuring that individuals understood they could decline or withdraw from the study at any stage without penalty or consequence. Participants were also informed of their right to access a summary of the study's findings upon completion. To protect confidentiality, pseudonyms were used in the transcripts, the analyses and the reporting. All personally identifying information was removed from data files, and sensitive materials such as interview recordings, transcripts and student scripts were stored securely on password-protected computers and backed up in encrypted folders accessible only to the research team. Physical documents were kept in locked cabinets within the principal investigator's office. Data handling and storage complied with both institutional policy and international standards for confidentiality, privacy and secure archiving. Respect for participants' autonomy and dignity was maintained throughout the research process. Consent was obtained separately for audio recording, and participants were reminded of their right to pause or stop the interview at any point. These measures ensured that the study met the ethical requirements of transparency, voluntariness and confidentiality, thereby safeguarding the welfare and rights of all participants.

4. Results

The results are presented in two major subsections: (1) assessment strategies employed by lecturers for hearing-impaired (HI) students and (2) challenges that constrain valid and equitable assessment of HI students. A triangulation table is provided to illustrate the integration of data sources (interviews, observations and examination script reviews), while frequencies (n/30) indicate the density and representativeness of evidence across themes.

4.1. Assessment Strategies for HI Students

From **Table 1**, the findings revealed two dominant approaches to assessment: equal treatment/standardised assessment and adaptive strategies. These practices reflect lecturers' attempts to navigate resource constraints, limited interpreter availability and diverse student communication needs.

The findings from lecturers' experiences align closely with the conceptual framework of communication flow between HI students and teachers. At the heart of the framework is the recognition that assessment depends on clear two-way communication: students require access to instructions in order to demonstrate their knowledge, while teachers rely on student responses to adjust instruction. However, the analysis shows that this feedback loop is repeatedly disrupted by barriers in language and communication.

Half of the participants (5/10; 7 fragments) indicated that HI students are assessed in the same way as their hearing peers, with lecturers administering identical assignments, quizzes and examinations without modification. While this practice reflects a principle of procedural fairness, it overlooks the communicative needs of HI learners. Within the framework, such an approach bypasses the central barrier, students' limited capacity to decode spoken or written English and consequently undermines the validity of assessment outcomes. The disruption emerges at the "communication modes" stage, where content is delivered in formats inaccessible to many HI students. As a result, assessments measure linguistic barriers rather than actual subject knowledge, weakening the accuracy and fairness of evaluation.

Table 1. Assessment strategies for HI students.

Category	Extract Number	Examples (Quotes)	Frequency
Equal Treatment/Standardised Assessment	T6	*There are no different questions for the deaf students and the normal students. They all write the name papers for quizzes, assignments and end-of-semester examination.*	5/10 participants, 7 fragments
	T1	*I teach and give them assignment like other students. At times, I am not aware that there are students who are deaf in my classroom.*	
	T2	*Our assignment here is mostly practice. I manage with the signs when the interpreters are not available. At times, I write on a paper to help the understand.*	
	T7	*…we are made to allow them do the assignment or the project like the hearing students.*	
	T8	*…they write examination like any other students…*	
Adaptive Strategies by Lecturers	T1	*Writing on paper when signs fail……..*	4/10 participants, 5 fragments
	T7	*Rewriting instructions on the board*	
	T3/T8	*Using practical demonstrations and diagrammatic questions*	
	T8	*We are supposed to structure our assessment to be approximately 70% practical and 30% theoretical, with the theory always reinforced through hands-on demonstrations. Hmm! This integrated approach ensures that students develop strong practical skills rather than relying solely on abstract concepts. Hmm! But, you know, with limited resources, it is hard to follow the 70-30 structure of assessment in TVET institutions like ours.*	

Source: Fieldwork, 2025.

Four participants (4/10; 5 fragments) reported adapting assessment practices to accommodate HI students' needs. These strategies included writing instructions on the board, using paper when signing was ineffective and relying on demonstrations or diagrams. Such measures align with the framework's "content and communication" component, as they represent lecturer-led efforts to bridge communication gaps and temporarily restore the disrupted feedback loop. However, in the absence of systemic supports such as standardised sign language, codified instructional resources and sufficient time, these adaptations remain ad hoc and inconsistent. As a result, gaps in comprehension and response persist, limiting the reliability and validity of assessment outcomes.

4.2. HI Students' Assessment Challenges

Table 2 revealed four major challenges that undermine the valid assessment of the HI students. Three participants (3/10; 3 fragments) observed that students often struggled with comprehension and execution of tasks, particularly when assessments were wordy or abstract, reflecting limited vocabulary and difficulty decoding instructions. Two participants (2/10; 2 fragments) highlighted students' limited writing proficiency, noting that responses frequently mirrored signing syntax rather than conventional grammar, making scripts difficult to interpret. Equally, three participants (3/10; 3 fragments) raised concerns about their lack of training in sign language and assessment methods, which restricted their ability to communicate instructions clearly and interpret responses accurately. Finally, four participants (4/10; 4 fragments) reported that inconsistencies in Ghanaian Sign Language (GSL) across regions introduced further confusion during assessments, with students and interpreters struggling to align meanings. The results highlight four interconnected challenges that hinder valid and equitable assessment of hearing-impaired (HI) students. Each of these categories can be directly mapped onto the communication flow framework, which shows how barriers disrupt the exchange of information and feedback between teachers and learners.

The first barrier is students' difficulties in comprehending and responding to assessment tasks. As the lecturers noted, HI students struggle with limited English vocabulary, weak foundations in written English and the absence of subject-specific signs. These limitations make it difficult for learners to decode instructions and assessment prompts, particularly when questions are phrased in long or complex sentences. For instance, T10 observed that, "whenever an instruction is long, they don't understand. You will see them confused." Within the framework, this problem sits squarely in the "communication modes" box, where learning content is transferred into assessment tasks. The failure to adapt language and instructions creates a barrier in the communication loop, preventing students from fully accessing the intended meaning of tasks, thereby skewing assessment outcomes.

Table 2. Assessment strategies for HI students.

Category	Description	Illustrative Quotes (Examples)	Frequency
Difficulties in Comprehending and Responding to Assessment Tasks	T1	*Anytime I take scripts of a deaf student to mark… they lack words (vocabulary)… I know the deaf students do not do well in examination… because of their weakness in the English language.*	3/10 participants; 3 fragments
	T8	*They don't understand the instructions. Even when the interpreters interpret, they still do not follow instructions.*	
	T10	*Hearing impairment learners struggle with long sentences… Whenever an instruction is long, they don't understand.*	
2. Limited Writing Skills in Assessment	T7	*They cannot write well. Class one pupils even write better than them.*	2/10 participants; 2 fragments
	T3	*Some of them write like they signing… one wrote 'needle first right arm' meaning 'the needle should be to sew the right arm of the cloth.*	
3. Imperative for Teacher Competence in Sign Language and Assessment	T2	*We have not been trained how to evaluate or assess the deaf students. So it is challenging assessing them.*	3/10 participants; 3 fragments
	T1	*There is difficulty assessing the HI students since I am not a special education teacher.*	
	S4	*Some teachers rely heavily on spoken language, using only minimal signing, while others lack signing proficiency altogether.*	
4. Lack of Codified/ Standardized Ghanaian Sign Language (GSL)	T8	*Those in Savulgu sign differently, Sekondi sign differently… When they all come here, it is difficult for us the interpreters… Some HI students at times achieve 5% understanding.*	4/10 participants; 4 fragments
	S4	*I do not understand most of the things the interpreter signs. It is better to always write the instruction on the board.*	
	S2	*The teacher signing is different from my JHS and SHS, so I don't understand them.*	
	S6	*We were not taught that way in SHS… During examination, I get confused.*	

Source: Fieldwork, 2025.

A second, related challenge is the limited writing skills demonstrated by HI students. Their responses often mirror the syntax and structure of Ghanaian Sign Language (GSL) rather than English, resulting in incomplete or incoherent answers. For example, T3 described how a student wrote "needle first right arm," directly reflecting signed syntax rather than English word order. From the framework's perspective, this barrier arises because students' communicative needs are not adequately supported in earlier stages of the loop. Without exposure to codified written input and adapted instructional practices, students cannot build the grammatical and structural competence needed to provide meaningful written responses during assessment. The result is a disruption in the feedback loop, as teachers receive scripts that are difficult to interpret, and students receive feedback that does not genuinely reflect their conceptual knowledge.

The third barrier involves the imperative for teacher competence in sign language and assessment of HI learners. The teachers repeatedly emphasised that they were not trained to assess HI students, with some relying heavily on spoken English and only minimal or inconsistent use of signs. As one student (S4) noted, "some teachers rely heavily on spoken language…making it difficult for me to grasp the explanations being given." This finding directly maps onto the framework's category of "insufficient teacher communication skills." If teachers lack signing proficiency, they cannot ensure that assessment tasks are delivered in accessible formats, nor can they accurately interpret students' signed or written responses. This undermines both sides of the feedback loop. Students do not receive clear instructions or feedback, and teachers misinterpret students' true learning levels.

Finally, the lack of codified or standardised Ghanaian Sign Language creates systemic challenges that extend beyond individual teacher competence. Regional variations in sign language mean that students and interpreters often struggle to understand one another. T8 reported that, "those in Savulgu sign differently, Sekondi sign differently… some HI students at times achieve 5% understanding." Similarly, the students themselves acknowledged confusion when interpreters used unfamiliar signs, especially during examinations. This barrier reflects a structural weakness in the communication flow: the absence of a standardised sign system undermines the clarity and reliability of the "content and communication modes" channel, leading to frequent breakdowns in both teaching and assessment. The consequence is a profound distortion of assessment outcomes, as students are unable to demonstrate their knowledge due to systemic inconsistency in language.

Taken together, these four categories reveal how multiple barriers intersect to disrupt the communication loop

described in the conceptual framework. Students' limited language proficiency and weak writing skills, teachers' lack of signing competence, and the absence of a standardised Ghanaian Sign Language contribute to the same outcome – the breakdown of effective communication between teachers and students. When the communication loop is fractured, assessment ceases to be a valid measure of learning and instead reflects linguistic and systemic obstacles. This alignment between data and framework underscores the need for targeted interventions, including simplified and accessible assessment tasks, improved teacher training in sign language and national efforts to codify Ghanaian Sign Language. Only by addressing these communication barriers can assessments provide accurate feedback that benefits both learners and teachers, fulfilling their intended role in enhancing learning.

4.3. Triangulation of Results

To strengthen the validity and traceability of findings, data from scripts, interviews and observations were systematically compared. As seen in **Table 3**, all available examination and assignment scripts from the 20 HI students were reviewed against three analytical categories: (1) comprehension of instructions, (2) written responses and vocabulary use and (3) evidence of sign language interference in syntax. Representative extracts from scripts were cross-validated with lecturer and student accounts as well as classroom observations.

Table 3. Triangulation of Results.

Source	Analytical Category	Representative Evidence
Student Scripts	Limited vocabulary/writing	Script extract: "needle first right arm" (reflecting GSL syntax)
Lecturer Interviews	Limited writing skills	T3: "Some of them write like they signing… one wrote 'needle first right arm'…"
Student Interviews	Difficulties expressing in English	S4: "I cannot always write what I mean; I write signs on paper."
Observations	Comprehension challenges during examinations	Students appeared confused when interpreting long instructions, even after translation.
Lecturer Interviews	Lack of standardised Ghanaian Sign Language	T8: "Those in Savulgu sign differently, Sekondi sign differently…"
Student Interviews	Confusion due to inconsistent signs	S6: "The teacher's signing is different from my JHS and SHS, so I don't understand them."

Source: Fieldwork, 2025.

This triangulation demonstrates that barriers identified in interviews and observations were consistently visible in students' written work. For instance, the "needle first right arm" script extract directly mirrors both the lecturer's observations of sign-influenced syntax and students' own accounts of difficulty writing in English. Similarly, the lack of standardised Ghanaian Sign Language reported by teachers and students was observed in real-time during examinations, where communication breakdowns were evident. The convergence of evidence across sources reinforces the robustness of the findings and highlights the systemic nature of assessment challenges for HI students in TTU.

5. Discussion

This study explored the assessment strategies and challenges faced by HI students and their lecturers in TTU, focusing on how evaluation occurs within a resource-constrained environment. The findings reveal that lecturers often adopt improvised strategies when assessing HI students. In many cases, they resort to administering the same examinations, quizzes and assignments used for hearing students (T1, T2, T6). While this practice reflects procedural fairness, it does not necessarily constitute equitable assessment, as it overlooks the communicative barriers faced by HI students. Onuigbo et al.[19] describe this as "integration without inclusion," where formal participation masks underlying exclusion. From a UDL perspective, such practices neglect the principle of multiple means of representation, since tasks are delivered only through written English without alternative, accessible formats.

Nevertheless, some lecturers attempt adaptive practices that align with inclusive assessment principles. Examples include simplifying instructions, rewriting tasks on the board,

using visual diagrams and integrating practical demonstrations into assessment (T3, T7, T8). These strategies resonate with multimodal pedagogical approaches highlighted by Agbenyega et al.[2] and reflect the aims of Universal Design for Learning[9], which advocate flexible and varied modes of instruction and evaluation. In particular, T8's efforts to maintain a 70% practical and 30% theoretical assessment structure, though constrained by limited resources, exemplify attempts to operationalise UDL's multiple means of action and expression by allowing students to demonstrate knowledge through hands-on tasks rather than relying solely on abstract written responses. Such practices indicate that while systemic gaps persist, individual lecturers demonstrate creativity and commitment in fostering more accessible learning environments.

Despite these adaptations, the study highlights significant challenges confronting HI students during assessments. Language proficiency emerged as the most pressing barrier. Lecturers consistently noted that students struggle with vocabulary, grammar and comprehension of long or complex instructions, leading to incomplete or incoherent responses (T1, T8, T10). These difficulties stem from the linguistic shift between the sign language used and written English (the medium of assessment). Similar findings in the literature show that this transition impedes academic achievement among HI learners, as written English develops more slowly due to reduced auditory input and limited opportunities for natural language acquisition[20]. From a UDL standpoint, these challenges highlight the absence of consistent multiple means of representation, as assessments rarely provide alternative or simplified linguistic formats.

Further compounding these challenges is the lack of standardized Ghanaian Sign Language (GSL). Regional variations and inconsistencies between interpreters often lead to confusion and misinterpretation of assessment instructions (T8; S2; S4). As Mbazi et al.[21] posit, the absence of codified technical vocabulary in sign languages is particularly detrimental in content-heavy disciplines like Fashion and Engineering. This issue mirrors findings by Takala et al.[22], who argue that the absence of standardised terminology severely constrains deaf learners' comprehension in technical education. Without a consistent linguistic system, the UDL principle of multiple means of engagement is undermined, as HI students face reduced opportunities for motivation and meaningful participation in learning.

Teacher competence in sign language and assessment practices also emerged as a systemic gap. Lecturers openly acknowledged their lack of training in evaluating HI students (T1, T2), while students reported inconsistent use of signing and over-reliance on spoken English (S4). This reflects what Chifinda et al.[11] calls "ad hoc inclusion," where inclusive practices depend on individual goodwill rather than institutional provision. The lack of professional development opportunities in sign language and inclusive pedagogy reinforces the marginalisation of HI students, as noted by Harber et al.[14], and Onuigbo et al.[19]. Strengthening teacher capacity in Ghanaian Sign Language and inclusive pedagogy would directly support UDL's call for varied and flexible approaches to instruction and assessment.

While the challenges are pronounced, it is important to emphasise that some lecturers actively seek to overcome these barriers, despite limited resources. Strategies such as using diagrammatic questions, signed videos, simplified language and practical demonstrations indicate promising practices that, if systematised and supported institutionally, could significantly enhance assessment equity. These align with recommendations from inclusive education scholarship[23], which call for multimodal, student-centred approaches consistent with UDL. Moreover, the finding that students prefer written instructions when interpreter signing is unclear (S4) suggests a potential pathway: integrating bilingual assessment practices that combine Ghanaian Sign Language and written English. Such practices reflect UDL's principle of multiple means of expression, enabling students to engage with assessments in formats that accommodate their diverse communicative repertoires.

Against these, the findings underscore both the constraints and the potential of inclusive assessment in Ghana's TVET institutions. By reframing challenges as opportunities to institutionalise existing good practices, the study highlights how UDL principles can serve as a roadmap for strengthening equity, moving beyond procedural fairness toward genuinely inclusive evaluation.

6. Implications

To move from policy intentions to genuine inclusion, institutions must adopt concrete and measurable actions

aligned with the principles of UDL. One practical step is the development of bilingual assessment templates that provide examination questions and key instructions in both English and GSL, possibly through the integration of QR-coded video translations or written sign interpretations. This would ensure that students with hearing impairments fully understand task requirements and expectations. Institutions should also implement dual assessment rubrics that assess both conceptual understanding and clarity of expression, thereby recognising linguistic diversity and preventing language-related bias in grading.

Another essential measure is the creation of standardised GSL glossaries for technical and subject-specific terms across TVET disciplines. The current lack of a codified and uniform GSL system has resulted in regional variations that cause miscommunication between students and interpreters, especially during assessments. Studies by Fobi et al.[24] and Oppong[25] and Mantey et al.[18] confirm that the absence of a nationally standardised sign language framework in Ghana leads to inconsistent signing practices, impeding mutual intelligibility and instructional clarity. Similarly, Oppong[25] highlights that GSL's regional diversity and lack of technical vocabulary limit effective communication in tertiary education, particularly in STEM and vocational subjects. The development of a centralised GSL glossary, therefore, would help minimise these inconsistencies, ensuring that both lecturers and interpreters share a common linguistic and conceptual framework.

Furthermore, institutions could establish departmental inclusion coordinators or disability focal persons to oversee and monitor the consistent implementation of inclusive assessment practices. These coordinators would also serve as resource persons, supporting lecturers and promoting accountability. Embedding UDL principles into curricula and assessment design would further require that all course evaluations incorporate multiple means of representation, expression and engagement, ensuring that students can demonstrate their knowledge through varied and accessible formats such as visual, practical or signed responses.

When UDL principles are translated into actionable strategies, such as bilingual assessment templates, dual rubrics, GSL glossaries, short teacher training modules and institutional accountability mechanisms, TVET institutions can create assessment environments that reflect the true abilities of HI students. These concrete steps move beyond symbolic inclusion, advancing fairness, accessibility and equity in education, while ensuring that all learners are given an equal opportunity to succeed.

7. Conclusions

This qualitative study aimed to investigate the assessment strategies used by lecturers to support students with hearing impairments a Takoradi Technical University in Ghana. Using a census sampling approach, the study collected data from 20 students with hearing impairments and 10 lecturers of the Takoradi Technical University who participated in semi-structured interviews. From the findings, four main conclusions were drawn. First, assessment practices for students with hearing impairments in Ghana's Takoradi Technical University remain predominantly traditional and linguistically inaccessible. Written examinations are the main evaluation mode, with minimal adaptation for sign language users, thereby limiting construct validity and equity in assessment outcomes.

Second, communication barriers arising from limited English proficiency, the absence of standardized Ghanaian Sign Language, and lecturers' low signing competence, systematically distort assessment validity. These barriers prevent hearing-impaired students from accurately demonstrating subject knowledge, resulting in assessments that measure language deficits rather than cognitive achievement.

Third, inclusive assessment initiatives are largely ad hoc and dependent on individual lecturers' creativity rather than institutional policy. Adaptive strategies such as visual aids, practical demonstrations, and simplified language improve comprehension but remain unsystematised, reflecting a gap between inclusive education policy and pedagogical practice.

Fourth, institutionalizing UDL-informed assessment frameworks is essential for equity and accountability. Standardized bilingual (English–Ghanaian Sign Language) assessment formats, structured lecturer training in inclusive pedagogy, and national codification of Ghanaian Sign Language are critical to achieving sustainable inclusion in higher education.

Five, lecturers' limited assessment literacy in inclusive education constrains effective accommodation for students

with hearing impairments. While most instructors express willingness to support inclusion, the absence of targeted professional development results in inconsistent practices and unintentional exclusion during assessment.

Finally, sustainable inclusion requires policy coherence across curriculum design, pedagogy, and assessment. Integrating inclusive assessment principles into teacher education, alongside institutional monitoring and resource allocation, will bridge the gap between policy intent and implementation within Ghana's TVET system.

Limitations

This study has some limitations that should be acknowledged. First, the sample was small and non-random, which limits the generalisability of the findings. Future studies could employ larger, more representative samples to strengthen the robustness of results. Second, some data were mediated through interpreters, which may have introduced bias or misinterpretation despite efforts at accuracy. Further research could minimise this limitation by triangulating data sources (e.g., combining interpreter-mediated interviews with direct observation and student self-reports). Third, the analysis relied largely on descriptive examination of student scripts, which, while insightful, does not capture all dimensions of assessment performance. Mixed-methods approaches, including quantitative analysis of learning outcomes, would provide a more comprehensive picture. Finally, the study was conducted in a single-country context (Ghana), and the findings may not fully reflect the experiences of HI students in other TVET systems. Comparative or cross-country studies could, therefore, extend understanding of how cultural, linguistic and institutional factors shape inclusive assessment practices.

Author Contributions

Conceptualization, F.B.; methodology, F.B., R.A.-A.; validation, F.B., R.A.-A., W.C.D., F.B., and R.O.M.; formal analysis, F.B., R.A.-A., W.C.D., and R.O.M.; investigation, F.B.; resources, F.B.; data curation, F.B., R.A.-A., W.C.D., and R.O.M.; writing—original draft preparation, F.B.; writing—review and editing, F.B., R.A.-A., W.C.D., and R.O.M. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare no competing interests.

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