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Research Paper

Breaking Barriers: Sign Language and Visual Aids in a Regular English Classroom for Hearing-Impaired Students

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Abstract

This study explored the effectiveness of integrating sign language and visual aids into English language instruction for hearing-impaired (HI) students in inclusive classrooms. Focusing on the reading comprehension skill of identifying claims in written texts, the research assessed how multimodal strategies could enhance English language learning outcomes for both HI and hearing students. A quasi-experimental design was used, featuring pre- and post-tests based on a 25-item multiple-choice assessment aligned with Bloom's Taxonomy. The results showed significant post-test gains for both groups, suggesting that the integration of sign language and visual aids can improve students' ability to identify claims in English texts. Classroom observations highlighted increased collaboration and the use of varied communication strategies. The findings underscore the need for inclusive pedagogical approaches and trained educators to support equitable English language learning. Further research is recommended to validate these findings across larger, more diverse samples. This study contributes to English language teaching (ELT) by demonstrating how inclusive methods can support reading comprehension and promote language learning for all students.

Keywords: *Inclusive Education, Hearing Impairment, Sign Language, Visual Aids*

INTRODUCTION

Society must strive to adopt policies that ensure the inclusion of both the hearing and the hearing-impaired. This commitment not only improves quality of life but also strengthens the foundation of equity in diversity (Ros et al., 2024). With this in mind, Special Education (SPED) was established. It focuses on providing a range of services to individuals with disabilities, supporting learners with specialized needs, and educating those who are normal (Morin, 2023). This vision is also supported by the study of Losberg and Zwozdiak-Myers (2021), which reinforced the main idea behind Inclusive Pedagogy Theory, the provision of equitable learning opportunities for all.

Learners with disabilities are included in the mainstream system of education (Pizarro et al., 2023). This account brought about exemplifications of adherence put forth by various SPED centers in the Philippines, as noted in the directory of the National Council on Disability Affairs; among them is SPED High School, located in Purok Kalubihan, Barangay Daga, Cadiz City, Negros Occidental. It integrates hearing-impaired students alongside their hearing peers in a regular classroom setting, specifically observed in Grade 11-Shielded Metal Arc Welding (SMAW). Despite the inclusive framework of SPED aimed at addressing the diverse needs of all learners, there remains a significant shortage of modified resources, particularly in terms of specialized training curriculum for English language teaching (ELT). According to Hankebo (2018), this problem is especially evident for hearing-impaired students in regular classrooms, where only a limited number of teachers possess the necessary skills in sign language to effectively support their learning.

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In diverse learning environments, visual information has been shown to stimulate cognitive engagement and improve retention, making it an effective tool for bridging communication gaps (Marschark et al., 2016). However, the study of Wainscott & Spurgin (2024) reveals that not all visual aids are considered effective for individual student needs, especially for the hearing-impaired. It further suggests that personalized visual materials should be used over generic visual materials to promote comprehension and support diverse learning requirements. Similarly, Birinci & Sarıçoban (2021) argued that the efficacy of visual aids and sign language depends on the learner's understanding of the teaching strategies put forth through their engagement. Thus, their utility is constrained and may be deemed ineffective without the integration of complementary strategies for the hearing-impaired.

These gaps subdue the extent of academic expression of students with hearing disabilities, limiting their means to participate fully in academic discussions (Basha et al., 2020). Hence, the factors that contribute to the communication barriers they bring about reveal that sign language interpretation and visual aids are of the essence; the lack thereof ushers learners into a facade of inclusivity that results in their poor performance. Moreover, it is of paramount importance to establish a rapport that unites every student in a mutual embrace of classroom diversity (Lin & Miloň, 2022). With this study, educators, school administrators, and policymakers can attain more understanding about the importance of accommodating diverse learners with various needs. This will also serve as a basis for revising or enhancing academic accommodation policies, training programs, and resource allocation to give additional aid and support for inclusive education.

In light of this, the researchers aim to explore the effectiveness of a pedagogical combo, featuring the assistive collaboration of sign language and visual aids, in enhancing the educational experiences of hearing-impaired students, alongside their hearing peers, integrated into regular classrooms. The differentiated instruction, crafted in the form of researcher-made daily pedagogical plans, is an intervention hypothesized to facilitate interactive communication and better academic outcomes. Through examining the impact of this combined approach, the researchers seek to provide actionable insights into the following questions:

1. What major challenges do students with hearing impairments face in regular English classes?
2. What interventions can be implemented to enhance interaction between students with hearing impairments and their peers in learning English?

LITERATURE REVIEW

Inclusive education

Moriña (2019) stated that the idea behind inclusive education was originally designed for younger students but gradually gained momentum as more disabled students completed their early education, necessitating a need to shift towards inclusive practices within higher education. Inclusive education is of tremendous importance towards diversity as it not only includes those for disabled learners but also actualizes inclusion to combat segregation and include a variety of opportunities for learners when it comes to accessing education (Shrestha & Bhattarai, 2024). Anderson (2020) believed that schools that embrace an inclusive education permit education that caters to the needs of students within each different classroom setting, which acts as a continuum that socializes the practicality of education for all.

Hearing-impaired

According to the University of Washington (2022), "hearing-impaired" is a term used to classify people with difficulties in hearing or hearing loss in any degree that ranges from mild to profoundly hard of hearing and deaf. Wan (2013) stated that hearing impairment harms the

development of vocabulary and literacy of students with disabilities, specifically those with hearing impairments, as they face challenges greater than those of their hearing peers. With this statement, the hearing-impaired are visual learners who rely heavily on visual cues for comprehension, as these individuals who are engaged in learning have no phonics ability and they exhibit an enhanced visual attention that benefits more through the use of visuals and visual materials (Thakur et al., 2023). Alshmasi (2019) argued that students with hearing impairments face challenges in self-contained classroom environments and should be addressed by qualified or trained specialized professionals to further facilitate, enhance, and improve interventions within a diverse conduct of teaching and learning.

Sign Language

Nendauni (2021) stated that sign language is a language that occurs naturally and works as a medium to communicate that occurs in the visual-gestural modality, as it was developed as a means to communicate by deaf individuals heavily relying on hands, face, and torso. With this statement, the ability to communicate is limited among the hearing impaired and deaf, which drastically affects their development, and they are concluded to be taught sign language to exhibit communication and learning needs (Akmese, 2016). American Sign Language (ASL) is a sign language that is commonly used and taught among those who are hard of hearing and deaf as a means to help easily recognize, understand, and receive information visually through the use of English as a medium for gestured language. ASL is a primary language being utilized by not just the

American people, but also by other English-literate places, as it originated from the French sign language with the intermixing of local sign languages that, over time, got improved and changed into a complex, mature, and rich language (NIDCD, 2019). When it comes to education, Sutterer (2021) believed that teaching ASL to hearing-impaired students and those who are normal not only creates additional academic benefit for students but also adapts and offers cognitive advancement, inclusivity, and cultural awareness through the uniqueness of ASL's morphology, structure, syntax, and grammar in their development for English literacy and communication. Additionally, according to Pirone et al. (2023), professionals must enhance their knowledge and skills to ensure the sustainability and growth of ASL education to incorporate research-based practices, promote diversity, and promote social justice.

Sign languages are learned from various sources, specifically teachers, students, and families, and are used by both deaf and hearing individuals for communication. Deaf and hearing children of deaf adults use it as their first language, specifically ASL, while those of hearing and deaf people learn it as an additional language. With this in mind, there is a continuing demand for qualified teachers to teach sign language, both L1 and academic subjects, while also exhibiting knowledge and proficiency in sign language and pedagogy to teach deaf and hard-of-hearing students.

Visual Aids

Visual aids are tools that enhance clarity, variety, and engagement within the teaching field for teachers to utilize as they help in presenting complex information clearly through a variety of visuals that strengthen attention for motivation and memory (Pateşan et al., 2018). According to Shabiralyani et al. (2015), students are greatly enhanced through visual aids as they serve as a motivational tool to increase their focus. Additionally, when it comes to the integration of visual aids for the hearing impaired, a study by Maisarah and Mohamad (2024) stated that visual aids play a vital role in conveying meaning that enhances memory and cognitive functions to foster engagement, as they promise contextual comprehension and integration of sign language and visual aids for deaf learners. Minimizing reliance on auditory input and strengthening visual and

kinesthetic learning pathways through reading-and-writing-based strategies accompanied by visual representations and ASL promotes an effective development of English literacy and acquisition towards the hearing impaired (Zambrano & Torres, 2025).

Synthesis

Moriña (2019) highlighted that inclusive education was initially for younger students but shifted towards inclusive practices in higher education. Shrestha and Bhattarai (2024), with Anderson (2020), believed that diversity brings inclusion and practicality that brings opportunities for all to access education. University of Washington (2022) and Wan (2013) emphasized the idea that the hearing-impaired are those who have difficulties in hearing and experience developmental delays in education compared to those with hearing. Moreover, Thakur et al. (2023) and Alshmasi (2019) argued that students with hearing impairments are mostly visual learners and are to be handled by specialized professionals. Numerous studies explained the idea of sign language within education for the hearing-impaired. Nendauni (2021), Akmese (2016), CDHH (2024), and NIDCD (2019) discuss that sign language is a language used to communicate using visual-gesture modality, and most people are taught to use the American Sign Language (ASL) as a medium for general English communication, literacy, and comprehension. Sutterer (2021) notes the crucial importance of ASL in an educational setting as it helps create a means to communicate specifically in English that also enhances literacy skills, comprehension, and vocabulary development for the hearing-impaired. On the other hand, Pirone et al. (2023) explained that sign language is taught and learned through various sources, specifically teachers who are specialized professionals who are still in demand to teach ASL.

According to Pateşan et al. (2018), visual aids are tools that enhance engagement and present visual clarity of complex information. Shabiralyani et al. (2015), with Maisarah and Mohamad (2024), pointed out that the use of visual aids enhances cognitive memory and visual focus among hearing-impaired learners as it promises contextual meaning and comprehension that helps them engage in the form of visuals or images. Additionally, Zambrano and Torres (2025) stated that strengthening visual and kinesthetic learning through reading, writing, visual aids, and ASL while reducing reliance on auditory input effectively supports English literacy development for the hearing impaired. The selected studies above provided evidence that the hearing-impaired, along with visual aids and sign language integration towards teaching English in an inclusive education, are a complex topic that allows opportunities to explore various perspectives on the effectiveness of teaching English using visual aids and sign language towards the hearing-impaired. In view of the selected studies presented, this study aims to present and strengthen the involvement of visual aids and sign-language integration of teaching English to the hearing-impaired within a regular classroom.

RESEARCH METHOD

Research Design

This study employed a quantitative research design as it sought to determine and examine the effectiveness of sign language and visual aids in supporting hearing-impaired students in an inclusive classroom. Quantitative research involves collecting and analyzing numerical data to test hypotheses, quantify variables, and generalize findings. Rooted in empiricist and positivist ideologies, it follows a logical approach to data collection and analysis, focusing on theory testing. Additionally, it involves the application of statistical, mathematical, and computational methods to gather and analyze data (Hassan, 2024). A quasi-experimental design will be utilized, consisting of pre-assessment, intervention, and post-assessment phases (Creswell & Creswell, 2023).

Participants of the Study

A purposive sampling strategy was used since the participants were deliberately chosen from the only inclusive Grade 11 SMAW class where hearing-impaired and hearing students were integrated. The sample size of 13 students (3 HI and 10 hearing peers) was considered sufficient as it represented the entire population of the class. Although relatively small, the sample affects the authentic composition of the classroom and provides meaningful data for understanding the effects of the intervention.

All 13 students participated in both the pre-test and post-test, allowing for a direct comparison of their understanding of identifying claims in written texts before and after the intervention. This ensured that the study captured the impact of the intervention on both the HI students and their hearing classmates, providing a more comprehensive understanding of how sign language and visual aids can enhance English reading comprehension and critical literacy skills among hearing-impaired learners in an inclusive classroom setting.

Research Instrument

To address the objectives of the study, the researchers will design a researcher-made pedagogical plan. It is the process of creating the underlying thought for an entire lesson or a particular learning activity. This will serve as a crucial instrument to structure and guide the teaching and learning process of the hearing-impaired students in the SMAW class with English as their subject. The content will be tailored to meet their unique needs, integrating sign language as a form of communication and visual aids to facilitate understanding. The researchers utilized the 4A's structure parallel to Kolb's Experiential Learning Theory. This theory explains the process whereby knowledge is created through experiences that center on Kolb's belief that concrete experience (Activity), reflective observation (Analysis), abstract conceptualisation (Abstraction), and active experimentation (Application) are to be used to develop a four-stage cycle designed to enhance effective learning (Practera, 2022). With that being mentioned, the pedagogical plan includes lesson objectives, materials, teaching strategies, and assessments that will be used during the teaching demonstration.

In addition to the pedagogical plan, a 25-item multiple-choice test was used to measure the students' ability to identify claims in written texts. The test items were designed as English reading comprehension tasks requiring students to identify claims (fact, value, and policy), aligning with critical literacy outcomes in English language learning. This ensured that the assessment directly reflected English reading and comprehension competencies relevant to the curriculum. The test, based on the Grade 11 competency EN11/12RWS-IIIij-6 and aligned with Bloom's Taxonomy (Bloom, 1956), was validated by English teachers and pilot-tested, confirming its reliability with a Cronbach's Alpha of 0.80. Furthermore, established ELT and reading assessment frameworks were consulted to ensure alignment with recognized principles of reading comprehension assessment in language education (Alderson, 2000). The test was administered as both a pre-test and a post-test, each with a 40-minute limit, and was complemented by structured classroom observations that documented participation, use of sign language, and engagement with visual aids.

Reliability and Validity of the Instrument

The suitability and appropriateness of the research instrument were evaluated by a team of education experts, which included three English teachers from SPED High School. The validation process indicated that the statements in the instrument were appropriate for the target respondents. Subsequently, a pilot test was conducted among Grade 11 students who were not part of the study in SPED High School. The reliability of the instrument was measured using Cronbach's Alpha, and the obtained coefficient was 0.80, indicating good reliability.

Data Gathering Procedure

The research process began with the pre-assessment phase, which aimed to identify the major communication challenges that hearing-impaired students face in a mainstream classroom. Observations of classroom interactions, student performance, and teacher instructional strategies were conducted to establish a baseline understanding of existing barriers (Pirone et al., 2023). Teachers underwent training in basic sign language, and visual aids, including multimedia materials, charts, and written instructions, were introduced to supplement learning (Rosen, 2019). Additionally, student and teacher surveys were used to assess perceptions of inclusivity and determine the initial effectiveness of available learning resources (Anderson, 2020).

The intervention was carried out over the course of two weeks, consisting of 60-minute classroom sessions. Each session followed the researcher-made pedagogical plan that integrated sign language and visual aids into English lessons for the Grade 11 SMAW students. Teaching strategies included collaborative group work, guided practice with visual prompts, and teacher-facilitated discussions using sign-language interpretation, which allowed both hearing and hearing-impaired students to actively engage in the learning process. The classroom was arranged in a semi-circular layout to enhance visibility and support visual communication, giving hearing-impaired students a clear view of both the teacher and their peers. This setup promoted peer interaction and reduced communication barriers. Providing such details on instructional strategies and classroom conditions ensures replicability and transparency in educational research, offering a procedural detail and a clear framework for inclusive classrooms.

During the intervention phase, teachers implemented sign language and visual aids into their lesson plans to enhance accessibility for hearing-impaired students. Classroom instruction incorporated gestural communication, digital visual aids, and structured written guidance to reinforce learning (Thakur et al., 2023). Midway evaluations allowed for modifications to the intervention strategies, ensuring that instructional methods remained responsive to student needs (Alshmasi, 2019). These steps helped assess whether inclusive teaching techniques improved comprehension and participation in class.

In the post-assessment phase, academic performance was analyzed using paired t-tests to compare pre-test and post-test scores, with the post-test results serving only as an indication of improvement rather than definitive proof of effectiveness. A paired sample t-test was selected because it is appropriate for comparing two related measurements (pre-test and post-test scores) from the same group of participants. This allowed the researchers to evaluate the effectiveness of the intervention by measuring within-group improvements rather than between-group differences. In addition, Cohen's d was calculated to determine the practical significance of the intervention beyond statistical significance. This approach provided insight into the potential impact of sign language and visual aids on the academic and social integration of hearing-impaired students.

Ethical Considerations

Throughout the study, ethical considerations were prioritized to ensure the protection of participants. Informed consent was obtained from students and teachers before data collection began. The confidentiality and anonymity of participants were maintained to safeguard their identities and responses. Moreover, participation was voluntary, and students or teachers could withdraw from the study at any stage without facing any consequences. Adopting a quantitative research approach, this study investigated the impact of inclusive teaching strategies on the academic performance and social integration of hearing-impaired students within mainstream educational settings (Shrestha & Bhattarai, 2024).

Findings and Discussion

Findings

Table 1. Descriptive Statistics of Pre-test and Post-test Scores

Test	Mean	Standard Deviation
Pre-Test	17	3.56
Post-test	18.54	3.15

The data presented in Table 1 illustrate the descriptive statistics for pre-test and post-test scores, highlighting the effectiveness of the intervention. The pre-test mean score of 17 reflects a moderate level of understanding among students before the intervention, with a standard deviation of 3.56 indicating moderate variability in their performance and suggesting diverse levels of knowledge within the group. Following the intervention, the post-test mean score increased to 18.54, demonstrating a significant improvement in student understanding, while the standard deviation decreased to 3.15, showing that scores became more concentrated around the mean. This suggests that the intervention helped reduce the performance gap among students. The combination of an increased mean and decreased variability underscores the effectiveness of the instructional strategies employed in enhancing overall student learning outcomes and fostering a more uniform level of comprehension across the class.

Table 2. Descriptive Statistics of Difference Scores (Post-test - Pre-test)

Test	Mean	Standard Deviation
Difference	1.54	1.56

Table 2 presents the descriptive statistics for the difference scores, which were calculated by subtracting pre-test scores from post-test scores to provide insight into the improvement each student experienced as a result of the intervention. The mean difference score of 1.54 indicates that, on average, students improved their performance by 1.54 points after the intervention, signifying a positive impact on their learning outcomes. The standard deviation of 1.56 reflects a moderate level of variability in these improvement scores, suggesting that while many students experienced gains close to the average, some students improved significantly more than others, and a few may have shown less improvement. This variability highlights that the intervention was effective for the majority of students, while also pointing to the need for further analysis to understand the factors influencing differences in individual student progress, ensuring that all learners can benefit from targeted instructional strategies in the future.

Table 3. Paired Samples t-test and Effect Size

Statistic	Value
t-statistic	3.55
Degrees of Freedom (df)	12
p-value	0.004
Cohen’s d	0.99

Table 3 presents the results of the paired samples t-test and effect size, which provide statistically robust evidence for the effectiveness of the intervention. The t-statistic of 3.55 indicates a significant difference between the pre-test and post-test scores. The degrees of freedom (df = 12) reflect the sample size of 13 students, which is standard in paired t-tests. The p-value of 0.004 is well below the conventional significance level of 0.05, providing strong evidence to reject the null hypothesis and suggesting that the observed improvement is highly unlikely to be due to chance. This confirms that the intervention had a statistically significant impact on student performance.

Furthermore, Cohen's d of 0.99 represents the effect size, indicating a large effect of the intervention. This means that the intervention had a substantial impact on student learning, not only statistically detectable but also practically meaningful. The large effect size suggests that the intervention was not only statistically significant but also practically meaningful, demonstrating its real-world impact on student learning.

In summary, Table 3 provides strong statistical evidence that the intervention was effective in improving student performance. The significant t-statistic, low p-value, and large effect size all highlight a positive and meaningful impact of the intervention on student learning.

Discussion

The quantitative data provide strong evidence of the intervention's success. Post-test scores showed a significant mean increase (from 17 to 18.54, Table 1), a large effect size (Cohen's d = 0.99, Table 3), and a reduced standard deviation (from 3.56 to 3.15, Table 1), indicating improved overall comprehension and a narrowing of the achievement gap among both the three hearing-impaired (HI) and nine hearing students.

Observations further illuminate the intervention's impact, highlighting the effectiveness of differentiated instruction within group activities. Hearing-impaired students struggle to understand texts and pictures alone without the hand signals, even with the simplest questions. However, the teacher, who possesses the ability to understand and communicate basic American Sign Language, translated these presentations, ensuring inclusivity and facilitating a rich learning experience for all.

In addition to that learning experience, researchers observed frequent and productive collaboration between HI and hearing students. For example, during activities focusing on claim identification, hearing students assisted HI students with complex sentence structures, while HI students, often strong visual processors, helped their peers identify subtle textual cues indicating claim type. Presentations provided further evidence of this collaborative learning. HI students confidently presented their analyses using sign language, demonstrating a clear understanding of the concepts. One instance involved an HI student effectively using visual aids to differentiate between claims of fact and value, then articulating this distinction in sign language, which the teacher seamlessly translated. This showcased the HI students' abilities and enriched the learning for all students.

Moreover, the mean difference score of 1.54 (Table 2) reflects the overall positive impact, while the standard deviation of 1.56 indicates variability in individual progress. This variability underscores the importance of differentiated instruction, as some students, regardless of hearing status, require additional support in grasping nuanced aspects of claim identification.

As mentioned above, the study primarily identified the major challenges faced by hearing-impaired students in a regular English class. Nonetheless, interventions such as sign language and visual aids, cited from prior research by Shabiralyani et al. (2015), Sutterer (2021), and Maisarah and Mohamad (2024), and facilitated by a qualified teacher, have proven instrumental in creating an inclusive and equitable learning environment that addresses the communication gap experienced

by students with hearing impairment.

CONCLUSIONS

This study highlights the significant impact of integrating sign language and visual aids in a regular English classroom to support hearing-impaired students, particularly in developing their ability to identify claims in written texts. Quantitative data revealed notable improvements in academic performance, while qualitative observations emphasized enhanced communication and peer collaboration. Based on these findings, it is recommended that teachers receive training in sign language and inclusive instructional strategies. Classrooms should consistently incorporate visual aids, adapt assessments to include multimodal responses, and implement differentiated instruction to meet diverse learner needs. Additionally, collaboration among educators, support staff, and families, along with institutional and policy-level support, is essential for sustainable inclusion.

Theoretically, the findings affirm and refine Inclusive Pedagogy Theory by demonstrating the practical value of multiple modes of representation and the centrality of differentiated instruction in English class. The study reinforces the theory's emphasis on creating learning environments where all students can participate meaningfully, while also highlighting the importance of teacher competence, contextual support, and multimodal assessment. By showing how sign language and visual aids enable hearing-impaired students to access abstract concepts like claims in texts, the research extends the theory to include more specific guidance on instructional design and assessment for learners with hearing impairments in mainstream classrooms, especially in a regular English class.

LIMITATION & FURTHER RESEARCH

This study, while offering valuable insights into the effectiveness of integrating sign language and visual aids in inclusive classrooms, is subject to several limitations and delimitations. The relatively small sample size (n = 13) restricts the generalizability of the findings; a larger, more diverse sample would strengthen the conclusions. The study focused on a specific set of instructional strategies, limiting the scope to the investigated methods and precluding comparisons with other inclusive teaching approaches. Furthermore, the short-term assessment period (1 week) limits our understanding of long-term effects on student learning and retention. The findings are also context-specific, potentially influenced by factors such as teacher expertise, school culture, and the specific classroom environment, which further limits generalizability to other settings. The inherent subjectivity in interpreting qualitative data, while providing rich insights, necessitates acknowledging potential researcher bias.

In addition to these limitations, several aspects of the study's design further delimit its scope. The study’s specific focus on claim identification within written texts (competency EN11/12RWS-IIIij-6), the types of visual aids used, and the level of teacher training in inclusive education practices all constrain the generalizability of the findings. These limitations and delimitations should be considered when interpreting the results, and future research should address these points to enhance the robustness and generalizability of the findings.

To build upon these findings, we recommend further research employing larger, more diverse samples and longitudinal studies to assess long-term impacts. Comprehensive teacher training in sign language and inclusive teaching methodologies is crucial, alongside the development of inclusive curricula that cater to diverse learning styles. Sufficient resources, including assistive technologies and ongoing professional development, must be allocated to support these initiatives. Finally, supportive policies promoting inclusive education and ensuring equitable access for all students are essential. By implementing these recommendations, educational institutions can create truly inclusive learning environments that foster the success and

well-being of all students, thereby solidifying the positive impact demonstrated in this study.

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