Empowering deaf and hard-of-hearing undergraduates: Innovative ESL teaching strategies

Sherin Rahman[1*], R Jinu[2]

[1,2]Noorul Islam Centre for Higher Education, Kumaracoil, Kanyakumari District, Tamil Nadu, India; sherinrahman.niche@outlook.com (S.R.).

Abstract: Instructing English as a Second Language (ESL) to Deaf and Hard-of-Hearing (D/HH) students presents a unique set of challenges as well as opportunities, requiring innovative and tailored approaches to ensure effective language acquisition. The present study investigates the effectiveness of an innovative ESL teaching approach, integrating Neuro-Linguistic Programming (NLP) techniques, in empowering D/HH undergraduate learners across select colleges in Kerala, India. The research objectives encompassed assessing language acquisition, analyzing its impact on confidence and communication abilities, and exploring the perceptions of both students and instructors. The control cohorts were set up using a pre-test/post-test strategy, involving 70 students and 10 ESL instructors. Quantitative data was analyzed using paired t-tests, demonstrating a significant improvement in language proficiency. The qualitative thematic analysis highlighted enhanced confidence, communication, and learning experiences. Cross-tabulation and chi-squared tests revealed no significant demographic associations with language proficiency. In general, the NLP-integrated ESL approach showed promising results in empowering D/HH undergraduates.

Keywords: Confidence levels, D/HH, ESL training, Language acquisition, Language proficiency, NLP.

1. Introduction

Around the globe, there are an estimated 70 million individuals who are deaf, as reported by The World Federation of the Deaf in 2021 [37]. Moreover, there are approximately 32 million deaf children worldwide. Unfortunately, a significant number of these children face challenges in acquiring reading skills, often attributed to the insufficient availability of resources that effectively connect sign language with reading, as highlighted by the European Union of the Deaf (EUD).

Educating individuals who are deaf or hard of hearing (D/HH) necessitates a comprehensive strategy which considers a range of unique factors. These factors encompass aspects such as age, degree of hearing impairment, preferred modes of communication, prior exposure to language instruction, as well as various socio-psychological elements including language aptitude, personality traits, cognitive approaches, and learning methods. It's crucial to remember that this demographic is not uniform in its characteristics and requirements. The diversity among students poses a significant hurdle for educators in tailoring materials to suit the specific needs of each learner.

Unconventional methods for teaching languages are not commonly found. The rise of fresh theoretical models and technological progress has heightened the level of competition in the academic sphere. This underscores the heightened importance for educators to possess the necessary skills and techniques to deliver information effectively and foster student engagement. Addressing these core challenges falls on teachers, who must implement tailored instructional methods influenced by subject matter demands, student interests, and the educator's teaching philosophy [34]. Educators worldwide are actively working to modernize and enhance their teaching and learning approaches based on data gathered on student responses to various instructional methods. Consequently, in a language acquisition context, the goal of communication becomes even more significant due to the conveyance of everyday

* Correspondence: sherinrahman.niche@outlook.com

meaning. This necessitates that language learners select communication strategies that are not only effective but also appropriate for their proficiency level [35].

Due to the lack of established teaching resources tailored for students with hearing impairments, educators are often compelled to devise and test their methods and techniques to effectively address their educational goals. Consequently, the notion of utilizing existing approaches and customizing them to suit the specific requirements of these students remains the primary basis for formulating inclusive and well-rounded lesson plans.
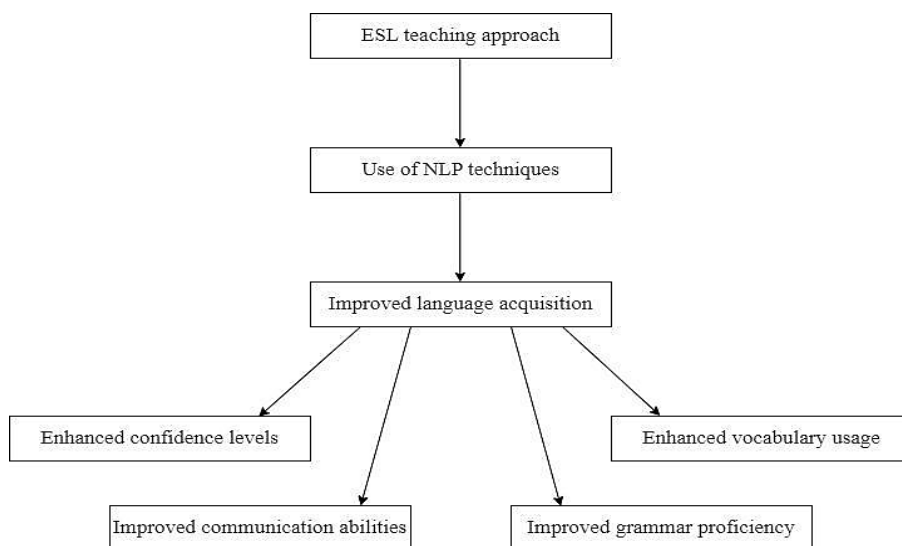
Figure 1.
Benefits of NLP-integrated ESL approach.

In the 1970s, Bandler and Grinder introduced the term "Neuro-Linguistic Programming" (NLP), a methodology aimed at enhancing communication and learning abilities. They hypothesized that by understanding how individuals effectively approached tasks, they could teach others using similar methods by emulating their thoughts, experiences, and expressions. O'Connor et al. [29] concur that NLP combines elements of both art and science, focusing on personal development while respecting each individual's uniqueness.

Educators, particularly language instructors, are encouraged to employ a wide range of available tools. NLP is highlighted as an exceptionally potent educational technique for achieving this goal. Therefore, the integration of NLP approaches, especially in foreign language instruction, holds the potential to bring about a transformative advancement in the teaching process.

2. Scope of the Study
The research is centred on empowering D/HH undergraduate students through an innovative ESL teaching approach, utilizing NLP techniques. The study will be conducted within the unique socio-cultural and linguistic context of Kerala, considering regional variations and cultural sensitivities. The outcomes of this research endeavour aim to provide valuable empirical insights and practical recommendations for educators, policymakers, and stakeholders involved in empowering D/HH undergraduates in their pursuit of English language proficiency within the educational landscape of colleges for the deaf in Kerala.

3. Literature Survey
3.1. Characteristics of D/HH students in language acquisition
Students with hearing impairment face significant challenges in grasping spoken language, both from instructors and peers. Likewise, they encounter difficulties in comprehending and expressing

themselves in written and oral forms due to their struggle with English. This difficulty extends to learning English as a foreign language (EFL). Unlike other subjects, special education schools catering to D/HH students generally do not include English as part of their curriculum. Even in inclusive educational environments, where D/HH students participate in classes alongside their hearing peers, they are frequently not provided with English instruction.

Niemann et al. [27] elaborate on how hearing impairment primarily leads to challenges in comprehending the external environment and articulating one's thoughts and feelings. This condition can impact various abilities including cognitive, linguistic, and social skills, resulting in limitations in social engagements. Many individuals may experience sentiments of seclusion and solitude. Hence, it is of utmost importance to identify hearing impairment as early as possible. Failing to do so could deprive a child of significant learning and socialisation opportunities, encompassing any form of interaction conducive to both learning and social development [30].

Sass-Lehrer [32] emphasises the increasing interest in implementing early intervention programs aimed at fostering intellectual development among D/HH students. This focus is crucial for ensuring that children attain the necessary levels of language proficiency and cognitive abilities essential for successful entry into primary school [4]. These foundational skills serve as the building blocks for acquiring core knowledge and competencies in communication and social interaction [13]. The duty of instructing English to D/HH pupils in nations that do not speak English presents a formidable challenge. Cameron [5] advocates for the introduction of English in specialized primary schools, emphasizing that early exposure to language significantly aids in language acquisition [32]. Within this context, the part of the English teacher in an ESL classroom, specifically catering to D/HH students, is pivotal. The teacher's demeanour, characterized by traits such as approachability, empathy, attentiveness, and patience, plays a crucial role in not only facilitating motivation but also in nurturing the students' growth both personally and academically [6].

In a recent study by Csizér and Kontra [7], the language learning patterns of 54 D/HH students from three European nations were investigated. The researchers employed interviews that are semi-structured and surveys focusing on individual traits to assess the motivation levels, learning approaches, and strategies employed by participants who were either deaf, severely deaf, or had received cochlear implants. The findings indicated that DHH students encountered challenges in the learning process, despite displaying high levels of motivation. The application of national sign language emerged as an efficient tool in foreign language acquisition. Additionally, the study emphasized that a combination of foreign language learning strategies and autonomous learning methods, when integrated with English instruction, yielded positive results. Falkowska [10] similarly advocates for the incorporation of national sign language as a means of communication in EFL instruction. Drawing from a year-long teaching experience with 25 Deaf students, Falkowska emphasizes the need for a tailored communication approach that aligns with each student's specific requirements. This may entail fostering a monolingual, bilingual, or trilingual learning environment based on individual needs, ultimately leading to improved student performance.

The attitude and motivation of Deaf students towards English lessons represent a significant concern. The process of learning English, introduced from the 3rd grade of primary school in Czechia, can be particularly stressful for Deaf children. This observation [26], sheds light on the challenges faced by Deaf students in language acquisition. She further emphasizes that while Deaf students enrolled in secondary schools in Czechia acknowledge the significance of foreign language education, they tend to exhibit reluctance towards participating in final exams. The researcher identifies potential factors contributing to this low motivation, including inadequate teacher training and limited experience in teaching Deaf students, along with a dearth of tailored approaches and instructing techniques for foreign language specifically crafted for the Deaf [26].

It is underlined that D/HH kids need more than just tailored instruction and assistance and also possess a unique educational background and distinctive social, cultural, and linguistic identities. They should also have access to the benefits of globalization and opportunities offered by technological advancements. Unfortunately, their participation in foreign language education is frequently limited. The existing approaches, methods, and techniques for teaching foreign languages fall short, and

educators are often inadequately equipped and prepared to cater to the specific needs of this student demographic [9].

3.2. Effective Instructional Strategies and Techniques

When it comes to teaching and learning different language skills for D/HH students, it's crucial to consider their unique characteristics and requirements. This group is diverse, encompassing factors like age, time of hearing loss onset, severity of loss of hearing, age of first device usage, initial response, support of family, available resources, technological application, and early childhood education. These variables significantly influence their language proficiency in English [22, 23]. For instance, research suggests that D/HH students in inclusive education settings require tailored activities that cater to their individual needs alongside language skill development [36].

To effectively instruct D/HH students, proficiency in sign language, a visual-gesture mode of communication utilizing hand movements, facial expressions, and upper body gestures, is imperative. Sign language possesses its distinct structure and grammar, playing a vital role in the day-to-day communication of D/HH individuals. For some D/HH children, sign language serves as their initial language [33], and exposure to proficient signers significantly aids in language acquisition [15, 38]. Implementing a code-blending system, which integrates the official language spoken combined with sign language, can effectively diminish societal and communication obstacles faced by D/HH individuals in their interactions. In the realm of special education, the adoption of 'differentiated instruction' tailored to individual needs as opposed to group dynamics is a widely embraced approach [14]. Small class sizes facilitate enhanced learning, as instructors can closely monitor the performance of D/HH students, offering immediate and targeted responses. Differentiated teaching hinges on understanding the unique traits, requirements, and learning styles of each student, ultimately striving to bolster their academic achievements [20]. Specifically for D/HH students, there is a notable emphasis on honing their phonological awareness through practices like word recognition and dictation [17].

D/HH students utilize mental imagery and visualization techniques, where they create mental pictures enriched with sensory details like taste, sound, or touch. This mental imagery proves valuable in language comprehension, as it provides a visual representation aligning with the tangible world. Research by Liu et al. [19] suggests that activities involving the matching of images, sounds, or symbols are more effective than direct exposure to entire stories for D/HH students. In the case of D/HH learners, non-verbal forms of communication are shown to be more effective than verbal language, according to the findings of Obosu et al. [28]. Recognizing the significance of visualization in D/HH education, the integration of assistive and instructional Technology has the potential to significantly improve students' language proficiency and cognitive abilities. This may encompass the use of tools such as instructional games, software boards, videos, and multimedia-based simulations [18]. Additionally, it is crucial to impart effective learning strategies to learners and familiarize them with autonomous methods of practising the target language [7].

D/HH students are known to excel in visual learning, as highlighted by studies like Mole et al. [25]. Marschark [21] further explains that these students tend to rely more on visual stimuli due to their hearing limitations. They compensate by actively observing their surroundings and focusing on lip-reading and visual cues. Additionally, they employ strategies like speech-based and visuospatial coding to process information. Gulati's [12] research on English teaching to 15 D/HH students supports these findings, emphasizing the relevance of visual learning in foreign language education. Gulati provides practical examples of how to incorporate visualization techniques into teaching various language skills.

Utilizing multimodal approaches is considered a fundamental aspect of instructing English to D/HH students, as emphasized by Kusters et al. [16]. Specifically, when it comes to personalizing vocabulary instruction, it is crucial to tailor the learning outcomes to individual traits, aligning the taught lexical items with the students' unique needs, interests, and preferences. Furthermore, the words introduced in the learning environment must be ones frequently used in everyday interactions. This approach facilitates the absorption of a larger vocabulary repertoire. D/HH students often tend to replace terms or sentence constructions with familiar ones or those they employ in their sign language-

based communication in simple Subject-Verb-Object (S-V-O) sentence structures. This preference is rooted in the fact that, as noted by Albertini and Schley [2], deaf learners primarily process information visually. Another effective strategy for enhancing vocabulary development is emotionalizing the learning process. When students establish a personal connection or emotional bond with a word or concept, they are more inclined to actively incorporate it into their practice. This process involves not only working with newly acquired vocabulary but also revisiting prior knowledge. As suggested by Domagała-Zyśk and Kontra [9], a key emphasis lies in employing both traditional and novel lexicon in communal settings, as opposed to the conventional method of secluded word exposure. Additionally, strategies such as inferencing and guessing play pivotal roles in the instructional process for D/HH students.

In terms of grammar instruction, it is advised not to introduce complex elements like the use of classifiers, as recommended by Dewi et al. [8]. Engaging activities that maintain the interest of learners should be prioritized. D/HH students in primary education tend to rely on a strict subject-verb-object sentence structure. They may have less exposure to more intricate language constructs, like turning phrases into queries, forming passive voice, or combining two sentences using pronouns, as noted by Berent [3]. While they may be familiar with a sentence like "He washes the car," they may find constructions like "Does he wash the car?" or "The car is washed" more challenging, as highlighted by Seliami and Stathopoulou [33]. This is an important consideration for teachers. Additionally, D/HH students often face difficulties in associating a written word with its spoken form, a finding supported by Domagała-Zyśk and Kontra's research [9]. According to Marschark's study [20], the mistakes made by D/HH students in reading and writing mirror those made by their hearing peers when learning EFL.

In an investigation led by Moharamkhani et al. [24], the impact of NLP on vocabulary acquisition was examined. After administering a 12-session treatment using the swish pattern, a recognized NLP technique, it was determined that this approach significantly enhanced the vocabulary achievement of English language learners. The researchers suggest that NLP holds practical applicability across various learner profiles and learning styles, making it a favourable option for incorporation in English language classrooms. As per Alamdar and Karbalaei [1], they highlight that NLP proves to be a valuable resource in bolstering the self-confidence of learners of the English language. Their study involved the selection of four classes, with the control group receiving traditional language teaching methods and the experimental group benefiting from a combination of NLP strategies along with traditional techniques. The outcomes of the research strongly suggest that NLP has a constructive role in enhancing the self-esteem of learners. The authors underscore that within the realm of English language acquisition, speaking is identified as the most demanding skill, requiring a substantial amount of self-assurance and inner drive.

In a study conducted by Farahani [11], the researcher explored the impact of NLP on the reading comprehension of English for Specific Purposes (ESP) students. Two intact groups, each consisting of 30 participants, were selected, with one designated as the experimental group and the other as the control group. The experimental group underwent instruction using NLP strategies to enhance their reading skills. The subsequent posttest, analyzed through ANCOVA, revealed the effectiveness of the implemented techniques in achieving the intended outcomes. Pourbahreini [31] delved into the impact of NLP on the grammatical proficiency of EFL students. The study specifically focused on passive sentence constructions, involving a cohort of 60 students for examination. Following the administration of various assessments and participant homogenization, an intervention program utilizing NLP activities was implemented. Strategies such as anchoring, VAK (visual-auditory-kinesthetic), and role-play were employed. Students who learn best through visual methods were taught interactively, emphasizing both passive and active voice structures. The outcomes revealed a notable difference in the assessment scores before and after the intervention for the experimental group. As a result, the researcher determined that employing NLP techniques proves beneficial for educators and learners seeking to improve their mastery of English grammar.

4. Research Gap

The existing literature provides a comprehensive overview of the challenges faced by D/HH students in acquiring EFL, along with effective instructional strategies and techniques tailored to their unique learning needs. The studies highlight the importance of sign language, differentiated instruction, visual learning, mental imagery, and multimodal approaches in facilitating language acquisition for D/HH students. Additionally, some research suggests the potential benefits of incorporating NLP techniques in enhancing specific language skills. However, while these studies offer valuable insights into teaching methodologies, there appears to be a notable research gap concerning the holistic integration of innovative ESL teaching techniques in colleges for the deaf in Kerala. Specifically, there is a need for a study that systematically examines the implementation and impact of these techniques in the specific context of colleges for the Deaf in Kerala, considering factors such as regional linguistic variations, cultural nuances, and the availability of resources. Such a study would provide valuable empirical evidence to inform effective teaching practices and empower D/HH undergraduates in their English language proficiency.

5. Research Objectives

- To assess the impact of NLP techniques on language acquisition and proficiency among D/HH undergraduate students in ESL programs.
- To analyze the influence of the innovative ESL teaching approach on the confidence levels and communication abilities of D/HH undergraduates and its contribution to their overall language learning experience.
- To investigate the perceptions and experiences of both students and instructors regarding the integration of NLP techniques in ESL education and its potential for enhancing language skills and promoting educational inclusivity for D/HH undergraduates.

6. Research Questions

- How does the integration of NLP techniques influence language acquisition and proficiency among D/HH undergraduate students in ESL programs?
- What is the effect of the innovative ESL teaching approach on the confidence levels and communication abilities of D/HH undergraduates, and how does this contribute to their overall language learning experience?
- What are the perceptions and experiences of both students and instructors regarding the integration of NLP techniques in ESL education, and how do they believe it enhances language skills and promotes educational inclusivity for D/HH undergraduates?

7. Hypotheses of the Study

$H1$: The integration of NLP techniques significantly enhances language acquisition and proficiency among D/HH undergraduate students in ESL programs.

$H2$: The innovative ESL teaching approach positively impacts the confidence levels and communication abilities of D/HH undergraduates, contributing to an improved overall language learning experience.

$H3$: Both students and instructors perceive the integration of NLP techniques in ESL education as a valuable tool for enhancing language skills and promoting educational inclusivity for D/HH undergraduates.

8. Proposed Methodology

The proposed methodology aims to rigorously evaluate the effectiveness of the NLP-integrated ESL module in empowering D/HH undergraduates in colleges for the Deaf in Kerala. The combination of quantitative assessments and qualitative insights will give a comprehensive grasp of the effect of this innovative teaching approach.

8.1. Research Design

The study utilizes a pre-test/post-test control group design, which enables a comparative analysis between two distinct groups: one receiving the NLP-integrated ESL module and another acting as a control group without the intervention. The pre-test establishes baseline language proficiency levels, while the post-test evaluates the impact of the intervention.

8.2. Sample Population

The study encompasses 70 undergraduate students who are either D/HH and are admitted in ESL programs across selected colleges for the deaf in Kerala. Additionally, 10 ESL instructors from these colleges will participate in the study.

8.3. Sampling Technique

Purposive sampling will be utilized to select colleges recognized for their innovative ESL teaching practices and inclusive environments for D/HH students. This technique ensures that participants are chosen based on specific criteria relevant to the research objectives.

8.4. Data Collection
8.4.1. Pre-Test Assessment

Prior to the initiation of the NLP-integrated ESL module, participants will undergo a pre-test to establish their baseline language proficiency levels. This assessment will encompass reading and writing skills.

8.4.2. Intervention

The NLP-integrated ESL module, designed on NLP presuppositions, will be implemented over 20 two-hour sessions. Each session will focus on specific NLP techniques and their application in ESL instruction.

8.4.3. Post-Test Assessment

Following the completion of the module, participants will go through a post-test to evaluate how the intervention has affected their language proficiency. Similar assessments to the pre-test will be administered.

8.4.4. Surveys and Interviews

Both students and instructors will participate in surveys and interviews to gather their perceptions and experiences regarding NLP-based ESL instruction. This qualitative data will provide valuable insights into the effectiveness of the approach.

8.5. Data Analysis

The quantitative data obtained from the pre-test and post-test evaluations will undergo suitable statistical analyses, including paired t-tests, to determine if there are noteworthy enhancements in language proficiency. Qualitative data from surveys and interviews will be thematically analyzed to extract key themes and patterns, offering a deeper understanding of participants' experiences and perceptions.

8.6. Ethical Considerations

All participants will be asked for their informed consent before taking part in the study. The confidentiality and anonymity of each participant will be strictly preserved throughout the research process. Any personal details that could identify individuals will be carefully removed from the data during the analysis phase.

8.7. Limitations of the Study

The study may be limited by factors such as the specific college selection and the availability of participants. The generalizability of the findings may be restricted to similar contexts.

9. Results and Analysis

9.1. Descriptive Statistics

Table 1, gives a comprehensive overview of the sample characteristics within the study focused on empowering D/HH undergraduates through innovative ESL teaching in select colleges for the deaf in Kerala. The sample characteristics presented in Table 1 demonstrate a diverse yet balanced representation of the study group.

Table 1.
Sample attributes of the study group.

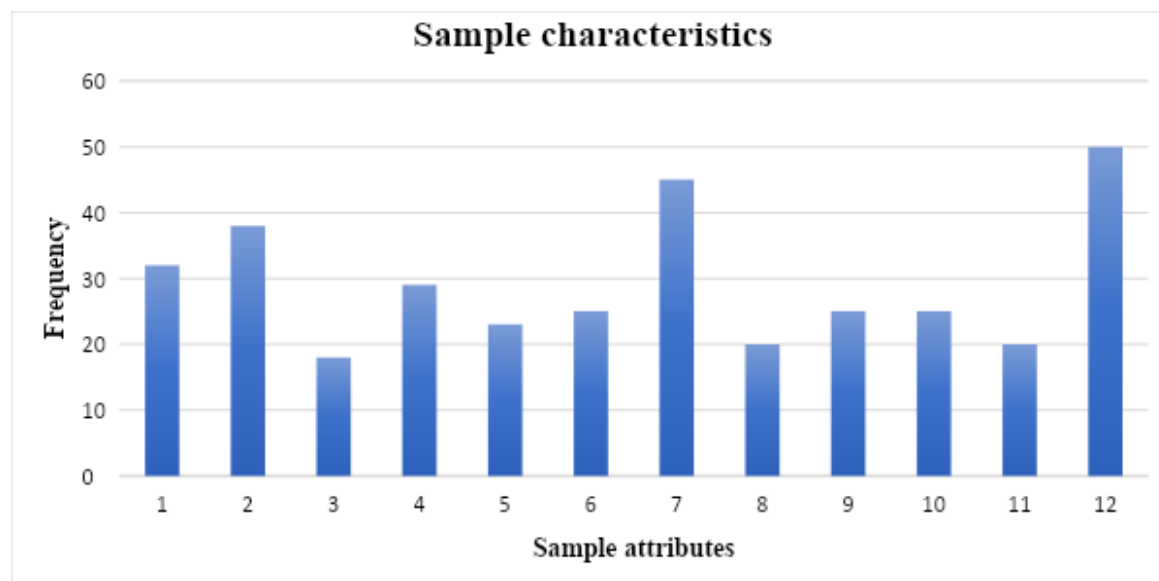| Characteristic		Sample size (n=70)	Percentage (%)
Gender	Male	32	45.71
	Female	38	54.29
Age (Years)	<20 years	18	25.71
	20-25 years	29	41.43
	>25 years	23	32.86
Hearing impairment	Deaf	25	35.71
	Hard-of-hearing	45	64.29
ESL program year	First year	20	28.57
	Second year	25	35.71
	Third year	25	35.71
Previous ESL training	Yes	20	28.57
	No	50	71.43

Figure 3.
Distribution of sample attributes.

The distribution of gender, age, hearing impairment, ESL program year, and previous ESL training provides a foundational understanding of the participants involved in the study. The sample consists of 70 participants, reflecting a balanced gender distribution with 32 male (45.71%) and 38 female (54.29%) students. The sample characteristics reveal a diverse range of ages among the participants, where a significant portion falls within the range of 20 to 25 years (41.43%), followed by those above 25 years (32.86%), and those below 20 years (25.71%). There is representation from both younger and older age groups, indicating a varied demographic composition. In terms of hearing impairment, 25 participants (35.71%) identified as deaf, while 45 participants (64.29%) reported being hard-of-hearing. The

distribution across ESL program years is as follows: 20 participants (28.57%) in the first year, 25 participants (35.71%) in the second year, and another 25 participants (35.71%) in the third year. The relatively even distribution across ESL program years indicates a consistent representation, allowing for meaningful comparisons and analyses across the different stages of undergraduate education. Regarding previous ESL training, 20 participants (28.57%) indicated prior training, while the majority, 50 participants (71.43%), reported no previous ESL instruction. The substantial percentage of participants with no previous ESL training (71.43%) highlights an opportunity to assess the impact of innovative ESL teaching on individuals who may not have been previously exposed to such instructional methods.

9.2. Paired t-tests (Pre-test vs. Post-test Scores)

The Paired t-test is a powerful statistical tool used to assess the significance of the differences between two related sets of data. In the context of our study, it serves as a crucial means of evaluating the impact of the innovative ESL teaching approach on the language proficiency of D/HH undergraduate students (Table 2). Specifically, it allows us to make a comparison among the pre-test and post-test scores of participants, providing statistical evidence of any significant improvements in language acquisition and proficiency following the implementation of the NLP-integrated ESL module. This analysis will be instrumental in determining the effectiveness of the intervention in enhancing the language skills of the targeted student population.

Table 2.
Paired t-tests.

Test type	Mean pre-test score	Mean post-test score	p-value
Language proficiency	60	75	0.002

Note: **p-value < 0.05.

The paired t-test analysis demonstrated a statistically significant improvement in language proficiency scores among the D/HH undergraduate students after the implementation of the NLP-integrated ESL module. With a recorded p-value of 0.002, which falls below the widely accepted significance threshold of 0.05, it suggests that the observed enhancement is improbable to be a result of random occurrence. This finding indicates that the innovative ESL teaching approach, incorporating NLP techniques, had a positive impact on language proficiency among the students in the sample.

9.3. Descriptive Statistics (Pre-test and Post-test Scores)

Pre-test and post-test scores were collected to measure participants' language proficiency levels prior to and following the intervention and the outcomes are presented in Table 3.

Table 3.
Descriptive statistics of pre-test and post-test scores.

Mean pre-test score	SD (Pre-test)	Mean post-test score	SD (Post-test)
60	8.5	75	7.2

The descriptive statistics of the pre-test and post-test scores reveal notable improvements in language proficiency. The mean pre-test score was 60 with an SD of 8.5, while the mean post-test score increased to 75 with a standard deviation of 7.2. This indicates an average increase of 15 points in language proficiency scores after the intervention. Moreover, the decrease in standard deviation in the post-test suggests reduced variability in scores, indicating a more consistent improvement across participants. These findings suggest that the innovative ESL teaching approach had a positive impact on the proficiency on language of the D/HH undergraduate students in the study.

9.4. Comparative Analysis (Experimental vs. Control Group)

Comparative analysis was conducted to evaluate the impact of the NLP-integrated instruction on language proficiency. The findings are displayed in Table 4.

Table 4.
Comparative analysis.

Group type	Mean improvement in proficiency
Experimental	20
Control	5

The comparative analysis between the experimental group, which received the NLP-integrated instruction, and the control group revealed noteworthy findings. The experimental group exhibited a substantial mean improvement of 20 points in proficiency, indicating a significant positive effect of the NLP-based approach. In contrast, the control group showed a mean improvement of only 5 points. This stark contrast underscores the effectiveness of the NLP-integrated ESL teaching method in empowering D/HH undergraduates to enhance their language proficiency. The results strongly support the adoption of innovative teaching strategies like NLP in ESL programs tailored for this demographic.

9.5. Correlation Analysis (Confidence Levels, Communication Abilities, Proficiency Improvement)
A correlation study was carried out to investigate the potential relationships between confidence levels, communication abilities, and proficiency improvement among the sample population. Table 5 displays the outcomes.

Table 5.
Correlation analysis.

Variable	Correlation coefficient	p-value
Confidence levels	0.75	0.001
Communication abilities	0.60	0.012

Note: **$p < 0.05$

The correlation analysis revealed noteworthy insights into the interplay between confidence levels, communication abilities, and proficiency improvement among D/HH undergraduates. The results demonstrated a strong positive correlation between confidence levels and proficiency improvement ($r = 0.75$, $p < 0.001$). This suggests that pupils who displayed greater levels of confidence also demonstrated greater advancements in language proficiency.

Similarly, there was an apparent favourable association among communication abilities and proficiency improvement ($r = 0.60$, $p = 0.012$). This suggests that students with more effective communication skills experienced significant enhancements in language proficiency. These findings underscore the importance of nurturing confidence and effective communication in ESL programs for D/HH undergraduates, as they play pivotal roles in facilitating language acquisition and overall proficiency.

9.6. Content Analysis (Written Assignments and Essays)
The content analysis conducted in this study focused on evaluating the written assignments and essays of D/HH undergraduate students enrolled in ESL programs. Specifically, the analysis honed in on two key aspects: grammar proficiency and vocabulary usage. This examination aimed to gauge the impact of the innovative ESL teaching approach on these fundamental language skills. The outcomes are displayed in Table 6.

Table 6.
Content analysis.

Mean grammar score (Pre-test)	Mean vocabulary score (Pre-test)	Mean grammar score (Post-test)	Mean vocabulary score (Post-test)
65	70	78	85

The results of the content analysis reveal a significant enhancement in both grammar and vocabulary scores following the implementation of the innovative ESL teaching approach. The average

grammatical score escalated from 65 in the pre-test to 78 in the post-test, showcasing a noteworthy improvement. Similarly, the mean vocabulary score witnessed a notable rise, ascending from 70 in the pre-test to 85 in the post-test. These findings underscore the effectiveness of the innovative ESL teaching approach, affirming its positive influence on the grammar and vocabulary skills of the D/HH undergraduate students.

9.7. *Cross-tabulation and Chi-squared Tests (Language Proficiency Levels vs. Demographics)*

In the pursuit of empowering D/HH undergraduates through innovative ESL teaching, it is crucial to discern the relationship between language proficiency levels and various demographic characteristics. Through cross-tabulation (Table 7) and chi-squared tests (Table 8), it is endeavour to discern any statistically significant associations between demographic variables such as gender, age, hearing impairment type, ESL program year, and previous ESL training, and the language proficiency levels of the participants. This analysis stands as a pivotal step towards tailoring ESL instruction to cater to the unique needs and circumstances of D/HH students, ultimately fostering an inclusive and effective educational environment.

Table 7.
Cross-tabulation outcomes.

Demographics		Language proficiency levels		Total
		High proficiency	**Low proficiency**	
Gender	Male	15	17	32
	Female	18	20	38
	Total	33	37	70
Age group	<20 years	8	10	18
	20-25 years	14	15	29
	>25 years	11	12	23
	Total	33	37	70
Hearing impairment	Deaf	10	15	25
	Hard-of-hearing	23	22	45
	Total	33	37	70
ESL program year	First year	8	10	18
	Second year	11	14	25
	Third year	14	13	27
	Total	33	37	70
Previous ESL training	Yes	12	8	20
	No	21	29	50
	Total	33	37	70

The cross-tabulation provides a detailed overview of the distribution of language proficiency levels across different demographic categories. For instance, when examining gender, it is observed that among the male participants, 15 students exhibit high proficiency, while 17 students show low proficiency. Among the female participants, 18 students demonstrate high proficiency, and 20 students exhibit low proficiency. This breakdown allows for a clear comparison of language proficiency levels within each demographic group. Similarly, the cross-tabulation reveals the distribution of language proficiency levels across age groups, hearing impairment status, ESL program year, and previous ESL training. This information will be instrumental in understanding any potential correlations or patterns between language proficiency and these demographic variables.

Table 8.
Chi-Square analysis.

Chi-squared value	p-value
7.45	0.116

Note: **p < 0.05

The chi-squared test was utilized to assess if there exists a statistically noteworthy correlation between demographic factors (gender, age group, hearing impairment, ESL program year, and previous ESL training) and proficiency levels in language. The computed chi-squared value of 7.45 with a corresponding p-value of 0.116 implies the absence of statistically relevant relationship at the conventional significance level of 0.05. This implies that any observed associations between language proficiency levels and the demographic variables may be due to chance variation. It's important to note that while no significant association was found in this sample, further research with a larger sample size may yield different results.

Overall, the cross-tabulation and chi-squared test provide valuable insights into the distribution of language proficiency levels within different demographic groups and the potential associations between these variables. This information contributes to a thorough comprehension of the variables that could affect language proficiency among D/HH undergraduate students in innovative ESL programs.

9.8. Qualitative Thematic Analysis (Surveys and Interviews)

The qualitative thematic analysis, conducted through surveys and interviews, aimed to delve into the perceptions and experiences of both students and instructors regarding the integration of NLP techniques in ESL education within the context of colleges for the Deaf in Kerala. This analysis sought to identify and explore key themes that emerged from their feedback and insights.

The thematic analysis revealed that participants, both students and instructors, unanimously recognized the significant positive impact of the NLP-integrated ESL instruction. Three prominent themes emerged from the qualitative data: the program's positive effect on confidence levels, the improvement in communication abilities, and the enhancement of the overall language learning experience. Students and instructors alike perceived this innovative approach as highly beneficial, offering valuable enhancements in these critical aspects of language education. This qualitative analysis reinforces the potential of NLP techniques to empower D/HH undergraduates, not only by improving language proficiency but also by bolstering their confidence and communication skills in an inclusive educational setting.

10. Discussion

In the realm of higher education, empowering D/HH undergraduates through ESL instruction requires specialized methodologies that meet not just their language requirements but additionally cater to their distinct learning styles and communication preferences. The findings of the study offer persuasive proof of the effectiveness of the NLP-integrated ESL approach in empowering D/HH undergraduates in ESL programs. The paired t-test analysis revealed a substantial improvement in language proficiency scores (p=0.002), affirming the effectiveness of the NLP-integrated ESL module in enhancing language acquisition and mastery. Descriptive statistics indicated balanced representation across gender, age, hearing impairment, ESL program year, and previous ESL training. Comparative analysis showcased a remarkable improvement in the experimental group (20 points) in comparison to the control group (5 points), underscoring the efficacy of the innovative approach. Correlation analysis emphasized the crucial role of confidence and communication in language proficiency enhancement. Content analysis highlighted notable gains in grammar and vocabulary skills. The cross-tabulation and chi-squared tests, while not yielding significant associations in this study, provide foundational insights into potential demographic influences on language proficiency. The thematic analysis of surveys and interviews revealed unanimous positive perceptions of NLP-integrated ESL instruction, particularly in boosting confidence, communication, and overall learning experiences. This qualitative evidence supports the quantitative findings, emphasizing the inclusivity and effectiveness of the NLP approach.

The innovative teaching methods significantly improved language proficiency, confidence levels, and communication abilities, contributing to a more inclusive educational experience.

While the study's sample size may limit the generalizability of findings, the results suggest that NLP-based ESL instruction can significantly benefit this student demographic. This research contributes to the broader conversation on inclusive education and the effectiveness of novel approaches in ESL programs tailored for D/HH undergraduates. It is recommended to conduct further research with larger and more varied participant groups. This will help build upon the positive results observed and offer a more thorough insight into effective ESL techniques for this particular demographic.

11. Conclusion

Empowering D/HH undergraduates with proficient English language skills is not only an educational imperative but also a pathway to greater inclusivity and enhanced academic and professional opportunities. This study illuminates the potential of NLP techniques in empowering D/HH undergraduate students in ESL programs within select colleges for the deaf in Kerala, India. The NLP-integrated ESL module led to a significant improvement in language proficiency, underlining its effectiveness. The qualitative analysis further substantiated the positive impact, with participants recognizing enhancements in confidence, communication, and learning experiences. While demographic factors did not show significant associations with language proficiency, this study lays the groundwork for further exploration with larger sample sizes. Overall, the findings advocate for the adoption of innovative ESL teaching approaches, such as NLP integration, to promote educational inclusivity and enhance language skills for this unique student population.

Copyright:

References

[1]   Alamdar, Fatemeh Sadat, and Alireza Karbalaei. "The Relationship between Neuro-Linguistic Programming and Anxiety and Self-Esteem among Iranian Intermediate EFL Learners." *International Journal of Educational Investigations* 2.8 (2015): 108-130.

[2]   Albertini, John A., and Sara Schley. "Writing: Characteristics, instruction, and assessment." *Oxford handbook of deaf studies, language and education* (2003): 123-135.

[3]   Berent, Gerald P. "English for deaf students: Assessing and addressing learners' grammar development." *International seminar on teaching English to deaf and hard-of-hearing students at secondary and tertiary levels of education: proceedings.* Prague: Charles University, The Karolinum Press, 2001.

[4]   Bornstein, Marc H., and Catherine S. Tamis-LeMonda. "Maternal responsiveness and cognitive development in children." *New Directions for Child and Adolescent Development* 1989.43 (1989): 49-61.

[5]   Cameron, Lynne. *Metaphor in educational discourse.* A&C Black, 2003.

[6]   Csizer, Kata, and Csaba Kalman. "Language learning experience: The neglected element in L2 motivation research." *Studies in Second Language Learning and Teaching* 9.1 (2019): 13-17.

[7]   Csizér, Kata, and Edit H. Kontra. "Foreign language learning characteristics of deaf and severely hard-of-hearing students." *The Modern Language Journal* 104.1 (2020): 233-249.

[8]   Dewi, Ayu Agustina, Umi Yawisah, and Syahreni Siregar. "Teaching English to children with hearing impairment: a case study in special school." *Pedagogy: Journal of English Language Teaching* 7.1 (2019): 10-19.

[9]   Domagała-Zyśk, Ewa, and Edit H. Kontra, eds. *English as a foreign language for deaf and hard-of-hearing persons: Challenges and strategies.* cambridge scholars publishing, 2016.

[10]   Falkowska, J. "Monolingual, bilingual, trilingual? Using different languages in an EFL class for the D/deaf." *English as a foreign language for Deaf and hard of hearing persons: Challenges and strategies* (2016): 55-72.

[11]   Farahani, Fahimeh. "The effect of neuro-linguistic programming (NLP) on reading comprehension in English for specific purposes courses." *International Journal of Education and Literacy Studies* 6.1 (2018): 79-85.

[12]   Gulati, B. "Visualizing: The most effective way to teach EFL to deaf and hard-of-hearing students." *English as a foreign language for deaf and hard-of-hearing persons: Challenges and strategies* (2016): 153-167.

[13]   Hitchins, Abigail RC, and Sarah C. Hogan. "Outcomes of early intervention for deaf children with additional needs following an Auditory Verbal approach to communication." *International journal of pediatric otorhinolaryngology* 115 (2018): 125-132.

[14]   Kauffman, James M., Dimitris Anastasiou, and John W. Maag. "Special education at the crossroad: An identity crisis and the need for a scientific reconstruction." *Exceptionality* 25.2 (2017): 139-155.

[15] Kontra, Edit H., and Kata Csizér. "An investigation into the relationship of foreign language learning motivation and sign language use among Deaf and hard of hearing Hungarians." *International Review of Applied Linguistics in Language Teaching* 51.1 (2013): 1-22.

[16] Kusters, Annelies, et al. "On" diversity" and" inclusion": Exploring paradigms for achieving Sign Language Peoples' rights." (2015).

[17] Kyritsi, Evi, Deborah James, and Susan Edwards. "Phonological awareness, letter-sound knowledge and word recognition in Greek deaf children." *of the 2007* (2008): 81.

[18] Lidström, Helene, and Helena Hemmingsson. "Benefits of the use of ICT in school activities by students with motor, speech, visual, and hearing impairment: A literature review." *Scandinavian journal of occupational therapy* 21.4 (2014): 251-266.

[19] Liu, Hsiu Tan, Jean F. Andrews, and Chun Jung Liu. "Literacy and deaf students in Taiwan: Issues, practices and directions for future research: Part II." *deafness & education international* 16.1 (2014): 23-36.

[20] Marschark, Marc, Venetta Lampropoulou, and Emmanouil K. Skordilis, eds. *Diversity in deaf education.* Oxford University Press, 2016.

[21] Marschark, Marc. "Cognitive functioning in Deaf." *Oxford handbook of deaf studies, language, and education* (2003): 464.

[22] Marschark, Marc. *Raising and educating a deaf child: A comprehensive guide to the choices, controversies, and decisions faced by parents and educators.* Oxford University Press, 2007.

[23] Mayberry, Rachel I. "Cognitive development in deaf children: The interface of language and perception in neuropsychology." *Handbook of neuropsychology* 8.Part II (2002): 71-107.

[24] Moharamkhani, A., L. Karimi, and D. Ahmadi. "The impact of neuro linguistic programming (NLP) on EFL learners' vocabulary achievement." *Journal Of Humanities And Social Science (IOSR-JHSS)* 21 (2016).

[25] Mole, Judith, Hilary McColl, and Mireille Vale. "Deaf and multilingual: A practical guide to teaching and supporting deaf learners in foreign language classes." *(No Title)* (2008).

[26] Morávková, Veronika. "Deaf students and their motivation to learn English." *Bachelor Thesis). Retrieved April* 20 (2011): 2017.

[27] Niemann, Sandy, Devorah Greenstein, and Darlena David. "Helping Children Who Are Deaf." *The Hesperian Foundation. Berkely, Califrnia, USA* (2004).

[28] Obosu, Gideon Kwesi, Joe Adu-Agyem, and Nana Afia Opoku-Asare. "The use of visual art forms in teaching and learning in schools for the deaf in Ghana: investigating the practice." (2013).

[29] O'Connor, Joseph, et al. "Introducing neuro-linguistic programming: psychological skills for understanding and influencing people." *(No Title)* (1993).

[30] Pagliano, Paul. "Using the senses." Pearson Education Australia, 2005. 319-360.

[31] Pourbahreini, Fatemeh. "The Effect of Neuro-Linguistic Programming Technique on Enhancing Grammatical Knowledge of Iranian EFL Learners at Intermediate Level." *English for Specific Purposes World* 16.44 (2015).

[32] Sass-Lehrer, Marilyn, ed. *Early intervention for deaf and hard-of-hearing infants, toddlers, and their families: Interdisciplinary perspectives.* Oxford University Press, 2016.

[33] Seliami, Giasemi, and Maria Stathopoulou. "Teaching English to deaf/hard of hearing students in primary education: A suggested methodology." *Research Papers in Language Teaching and Learning* 13.1 (2023): 112-120.

[34] Shara, Afifa May, and Tiodora Fermiska Silalahi. "Teachers' Attitude towards Minimum Competency Assessment at Sultan Agung Senior High School in Pematangsiantar, Indonesia." *Journal of Curriculum and Teaching* 11.2 (2022): 1-14.

[35] Silalahi, Dumaris E., et al. "Investigating Students' Motivation toward the Use of Zoom Meeting Application as English Learning Media during COVID-19 Pandemic." *Journal of Curriculum and Teaching* 11.5 (2022): 41-48.

[36] Szymanski, Christen, et al. *Critical Needs of Students Who Are Deaf or Hard of Hearing: A Public Input Summary.* Laurent Clerc National Deaf Education Center. Publications and Information Dissemination, Clerc Center KDES PAS-6, 800 Florida Avenue NE, Washington, DC 20002-3695, 2013.

[37] The World Federation of the Deaf, 2021. https://wfdeaf.org/.

[38] Van Staden, Annalene, Gerhard Badenhorst, and Elaine Ridge. "The benefits of sign language for deaf learners with language challenges." *Per Linguam: a Journal of Language Learning= Per Linguam: Tydskrif vir Taalaanleer* 25.1 (2009): 44-60.