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Utilization of Philippine School for the Deaf (PSD) E-Sign Library to Improve the Signing Skills of Deaf, Hard-of-hearing (DHH) Learners, and Stakeholders

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Abstract

The acquisition of an extensive vocabulary is essential for young readers to recognize terms they are familiar with or have previously encountered through memory or visual recognition. The distinctive learning traits of Deaf and hard-of-hearing (DHH) learners can pose challenges in their reading abilities. Sign language serves as their principal mode of communication owing to their visual learning capabilities. The majority of Filipino DHH learners experience challenges in understanding written vocabulary. Results from the teacher-created evaluation administered to Key Stage 1 pupils and adult learners indicate that they are categorized at the Frustration Level. The primary objective of this project is to tackle the difficulties faced by DHH learners regarding written language and to enhance the sign language proficiency of adult hearing learners through an intervention known as the Philippine School for the Deaf (PSD) E-Sign Library. The intervention consisted of multimedia learning materials accessible on any Android or iOS device. The research employed a mixed-methods strategy to gather both quantitative and qualitative data. Quantitative data were collected by the administration of pre- and post-tests to 36 student participants from grades 1, 2, and 3. Nine parents or guardians of the learner-participants acted as the adult learner-participants. The pre- and post-test results indicate a substantial increase in the mean percentage score, which implies that the PSD E-sign Library is an effective multimedia learning intervention for enhancing the sign language and literacy of Key Stage 1 DHH learners and adult learners. The learners' post-test results were classified as Independent Reading Level, indicating that they were able to independently communicate using sign language with exceptional comprehension following the intervention. Qualitative data were gathered using survey questionnaires and focus group interviews with the chosen stakeholders. The stakeholders' overall assessment of the PSD E-Sign Library was overwhelmingly positive, indicating a strong recommendation for its use as a learning intervention to enhance literacy and sign language knowledge among grades 1, 2, 3 DHH learners and adult learners. Stakeholders advocate augmenting the intervention by incorporating a slow-motion component and integrating further new sign varieties of Filipino Sign Language.

Keywords: deaf and hard-of-hearing education, Filipino Sign Language, e-sign

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1. Introduction

Language plays a crucial role in human interaction, serving as a foundation for communication, socialization, and cognitive development. For the Deaf and hard-of-hearing (DHH) community, sign language is an essential means of expression that enables them to engage meaningfully with the world. Nonetheless, a considerable issue emerges when numerous deaf children are born to hearing parents who possess minimal to no familiarity with sign language. This communication gap can hinder the linguistic and social development of deaf children, making it difficult for them to acquire early literacy skills and interact effectively with their families. Recognizing this need, the PSD E-Sign Library is an initiative designed to promote Filipino Sign Language (FSL) awareness and literacy by providing video learning materials tailored for young learners, parents, and other stakeholders.

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The majority of deaf children are born to hearing parents who are not familiar with sign language at birth, which can lead to limited language exposure during early childhood. Despite the increasing recognition of the importance of sign language in education, the lack of accessible and structured learning resources remains a pressing issue. Online learning resources for the DHH and adult hearing learners are essential to gain awareness of proper communication in FSL. Research has shown that families who learn sign language together experience stronger emotional bonds, better communication, and improved educational outcomes for their deaf children [1]. However, in the Philippines, access to formal FSL education is limited, particularly for hearing parents who may not have the time or resources to attend traditional sign language classes. As a result, many deaf children grow up in environments where their primary caregivers struggle to communicate effectively with them, leading to delays in language development and potential barriers to academic success.

Additionally, studies indicate that most hearing adults who learn sign language do so for professional purposes, such as becoming interpreters or educators, rather than for direct family communication [2]. This underscores the deficiency in resources specifically tailored for parents who require proficiency in FSL to engage with their deaf children on a regular basis. Effective communication strategies, including visual cues, shared book reading, and structured vocabulary-building, are crucial for fostering language acquisition among young deaf learners [3][4]. In the absence of sufficient support, numerous families turn to informal and frequently unreliable communication strategies, which may fail to establish the linguistic foundation essential for their child's cognitive and social development.

The necessity of tackling this issue is clear due to the lasting effects of early language exposure. Deaf children who lack early access to a fully accessible language may experience delays in cognitive and academic development, limiting their opportunities for future success. By providing structured and accessible video learning materials, the PSD E-Sign Library seeks to empower parents, guardians, and educators with the tools needed to bridge the communication gap. Lessons in this program will be aligned with vocabulary from the Philippine Registry of Interpreters for the Deaf to ensure accuracy and cultural relevance. The availability of these resources through digital platforms will further enhance accessibility, allowing more families to benefit from FSL education.

The PSD E-Sign Library is a crucial step toward fostering a more inclusive environment for the Deaf community. By equipping hearing parents and other stakeholders with essential FSL skills, this initiative promotes early literacy, strengthens family relationships, and advocates for greater awareness of Deaf culture. Given the limited resources available for FSL education in the Philippines, this innovation serves as a valuable tool for improving Deaf education and ensuring that all children, regardless of their hearing ability, have the opportunity to develop strong communication skills.

2. Research Questions

The primary objective of this research is to develop an appropriate intervention to spread Filipino Sign Language (FSL) awareness among DHH learners, hearing adult learners, and other stakeholders who are responsible for the upbringing of children who are DHH. This study aims to identify the level of FSL proficiency before and after the implementation of PSD E-Sign Library. It also aims to describe the development process of this innovation. Moreover, it shows the suggestions from the stakeholders based on their experiences in utilizing PSD E-Sign Library. Finally, this research seeks to determine if there is a significant relationship between parents' sign language proficiency and their children's academic performance. Specifically, the objectives of this investigation are to address the subsequent inquiries:

1. What is the sign language proficiency level of Key Stage 1 learners, parents, guardians, and

other stakeholders before the implementation of the PSD E-Sign Library intervention?

2. How can the PSD E-Sign Library be developed and validated as an effective learning tool for Filipino Sign Language education?

3. What changes in sign language proficiency can be observed among parents, guardians, and other stakeholders after implementing the PSD E-Sign Library?

4. What are the issues and challenges encountered in the implementation of the PSD E-Sign Library?

5. Is there a significant relationship between parents' sign language proficiency and their child's academic performance?

By addressing these questions, this study aims to assess the effectiveness of the PSD E-Sign Library, identify challenges in its implementation, and explore ways to enhance its impact on Deaf education. The findings will contribute to improving communication between deaf children and their families, ultimately fostering a more inclusive and supportive learning environment.

3. Methodology

In this research endeavor, mixed methods were utilized. The said design involved quantitative and qualitative data collection [5]. In addition, the mixed-method design allows embedding qualitative data within the research process within the research process. Such an approach can help the researcher obtain a qualitative information, through survey questionnaires and focus group interview, after the implementation of the intervention.

3.1 Participants and/or Other Sources of Data and Information

The investigation included learners in grades 1, 2, and 3 who were enrolled in the Philippine School for the Deaf during the 2024-2025 academic year. The gender distribution of participants is illustrated in Table 1. Males comprised 19 or 53% of the population, while females comprised 17 or 47% of the total population.

Table 1. Distribution Learner Participants According to Gender

Gender	Grade 1	Grade 2	Grade 3	Total	Percentage
Male	4	9	6	19	53%
Female	7	5	5	17	47%
Total	11	14	11	36	100%

The study assumes that males are more prevalent than females in the actual execution of this research study. The entire lower grades or key stage 1 population of PSD during the school year 2024-2025 is represented by a 100% participation rate.

Table 2. Profile of the Participants in the Evaluation of the PSD E-Sign Library Intervention and Focus Group Discussion (FGD)

Participants	Age	Gender	Profession	Hearing Ability/Loss
A	35	Male	Parent	Hearing
B	48	Female	Teacher	Regular Hearing
C	34	Female	Teacher	Profound Hearing loss
D	38	Female	Teacher	Hard-of-hearing

Table 2 delineates the characteristics of the stakeholders who assessed the tools and the PSD E-Sign Library Intervention. It delineates their age, occupation, and auditory capability or impairment. Purposive sampling method was utilized to represent the different stakeholders who have strong interest in the Deaf education, namely, parents, teachers, and representatives from the hard-of-hearing and Deaf communities.

3.2 Research Instrument

The study collected quantitative data using a validated evaluation tool to gather expressive FSL skills of the adult learners

composed of hearing parents, guardians , and stakeholders. It adapted the rubrics being utilized by the Philippine Registry of Interpreters for the Deaf (PRID) which include expressive signing of words. It utilized a 100-item test for the adult learners which contains basic sign language vocabulary. Quantitative data from Key Stage 1 learners were gathered through 50-item test through a video presentation. Both DHH and hearing adult learners are expected to execute the sign once they see the vocabulary.

The researcher sought the assistance of experts in the field of Deaf Education to evaluate the appropriateness and coherence of the test questions. The instrument was presented to a panel of specialists, including special education teachers, sign language interpreters, and sign language instructors, for content validation. The recommendations provided by these validators were carefully reviewed and incorporated into the final version of the test.

The PSD E-Sign Library intervention is in the form of video learning material. FSL is executed with a word on the lower right. Likewise, there is a caption at the lower part of the video. Their scores are recorded in the PSD E-Sign scoresheet which contain Pre Test, Post Test, and the remarks columns. The research modified the "Reading Level Proficiency Rubric" from the Philippine Informal Reading Inventory (Phil-IRI) [6] to assess and characterize the respondents' vocabulary proficiency. The scale is rated as follows: 0-15, Frustration Reading Level, indicating that the learner encounters terminology so challenging that they are unable to comprehend it well; Individuals aged 16-35 possess an Instructional Reading Level, indicating that they benefit significantly from teacher-led education in Filipino vocabulary. Conversely, those aged 36-50 exhibit an Independent Reading Level, demonstrating practically flawless reading and comprehension abilities autonomously via Filipino Sign Language.

Most of the vocabulary was derived from the Basic Sign Language Module of the PRID. Adapted Proficiency Level for adult learners are rated as: 0-35, Frustration Reading Level, 36-74, Instructional Reading Level, and 75-100, Independent Reading Level.

This study employed the PSD E-Sign Library Feedback Form for qualitative data collecting to assess the overall impression and usefulness of the intervention for content, layout, and accessibility. It comprises a five-point Likert Scale that can be completed by marking the number corresponding to the assessors' responses. The criteria on the specified scale were assessed as follows: 5 - Strongly Agree; 4 - Agree; 3 - Neutral; 2 - Disagree; 1 - Strongly Disagree. The weighted means were analyzed using the same arbitrary scale: 5 – Strongly Agree, indicating strong endorsement of the PSD E-Sign Library as an intervention; 4 – Agree, indicating endorsement of the PSD E-Sign Library as an intervention. 3 – Neutral, indicating that the PSD E-Sign Library may or may not be appropriate for intervention and requires more changes; 2 – Disagree, indicating a negative assessment of the PSD E-Sign Library as an intervention; and 1 – Strongly Disagree, signifying a very negative assessment of the proposed intervention, suggesting its unsuitability for DHH learners. It also includes a comments box for targeted feedback and suggestions from stakeholders. Additionally, a focus group discussion (FGD) was done to identify the obstacles, views, and opinions regarding the execution of the study.

4. Results and Discussions

In the field of education, the integration of diverse learning tools is essential to address the varying needs of students. Among those requiring special attention are children who are deaf or hard of hearing, as they encounter distinct challenges that go beyond the scope of the traditional classroom. In the study conducted by Mingsiritham and Chanyawudhiwan [7], the DHH learners' academic achievement scores after the implementation of online learning resources showed a significant increase compared to their scores prior to its use. Similarly, the present research yielded parallel findings, demonstrating a marked improvement in learners' performance. The online sign language intervention also produced positive learning outcomes among DHH students, as evidenced by the study conducted by Madronio [8].

The following are the results of the study:

4.1 Problem 1: What is the sign language proficiency level of Key Stage 1 learners,

parents, guardians, and other stakeholders before the implementation of the PSD E-Sign Library intervention?

A pretest was conducted in order to measure the current level of sign language proficiency of Key Stage 1 learners. It is in the form of 50-item test where results are shown in Table 3.

Table 3. Mean Percentage Scores (MPS) of Pre-Test of Key Stage 1 Learners

Grade Level	No. of Items	Average Pre-Test Score	Mean Percentage Score (MPS)	Level of Proficiency
1	50	11	22%	Frustration
2	50	14	28%	Frustration
3	50	15	30%	Frustration

Table 4. Mean Percentage Scores (MPS) of Pre-Test of Parents, Guardians, and other Stakeholders

Adult Learners	No. of Items	Individual Pre-Test Scores	Mean Percentage Score (MPS)	Level of Proficiency
1	100	26	26%	Frustration
2	100	10	10%	Frustration
3	100	27	27%	Frustration
4	100	21	21%	Frustration
5	100	18	18%	Frustration
6	100	11	11%	Frustration
7	100	35	35%	Frustration
8	100	31	31%	Frustration
9	100	44	44%	Instructional
10	100	20	20%	Frustration

The result of the pre-test shows that 9 out of 10 adult learners fall under Frustration Reading Level while 1 fell under the category of Instructional Reading Level.

4.2 Problem 2: How can the PSD E-Sign Library be developed and validated as an effective learning tool for Filipino Sign Language education?

Development of the PSD E-Sign Library was done through a consultative meeting and focus group discussion (FGD) with the school-based registered FSL interpreters, Deaf, and hard-of-hearing teachers. Thematic analysis was employed to identify and interpret recurring patterns, themes, and underlying meanings from the FGD. Basic words included in this study were carefully chosen and executed to include the current and emerging FSL. The themes that emerged from the meeting and FGD are: inclusion of FSL variations, captioning, and video creation by category or subject area.

Inclusion of new variations of FSL. Considering that the Philippines is an archipelago, it is no surprise that variations in Filipino Sign Language (FSL) have naturally emerged. These regional differences are a reflection of the country's geographic diversity and cultural richness. Just as spoken languages in the Philippines have developed into distinct regional dialects, FSL has evolved unique sign variations influenced by local customs, traditions, and interactions within Deaf communities. These variations highlight the dynamic and living nature of FSL as a language shaped by context, community, and culture. They also serve as a testament to the resilience and creativity of the Filipino Deaf community in preserving their identity while embracing linguistic diversity [9].

Inclusion of captioning in the video. Captioning accuracy plays a vital role in promoting accessibility, ensuring that Deaf and hard-of-hearing individuals can fully engage with information, communication, and entertainment. When captions are inaccurate—whether due to omissions, misspellings, or misinterpretations—they create barriers that can lead to confusion, misinformation, frustration, and ultimately, social exclusion. This not only undermines the viewer's right to

equal access but also affects their ability to participate meaningfully in education, employment, and public discourse. Recognizing the importance of accurate captioning means understanding its impact on the daily lives of millions. By advocating for higher standards, investing in professional captioning services, and holding media platforms accountable, we take concrete steps toward building a society that values inclusivity, respect, and equal opportunity for all [10].

Video Creation by Category or Subject Area. During the Focus Group Discussion (FGD), it was agreed that the videos to be developed should be categorized by subject area. The identified topics include: Alphabet, Numbers, Days of the Week, Months of the Year, Adverbs of Time, Greetings and Polite Expressions, Personal Information, People, Family and Relationships, Question Words, Pronouns, Basic Action Words, Basic Adjectives, Quantity, Colors, Sizes and Shapes, Parts of the Body, Mental Actions, Emotions, Clothing and Hygiene, Places (Directions/Locations), Parts of the House and Household Items, and Food and Drinks. The development of the video learning materials follows a structured three-phase process to ensure accuracy, relevance, and accessibility. These phases are:

Gathering Phase. This initial stage involves the collection of essential content, including key vocabulary, concepts, and themes based on the curriculum and learning needs of Deaf and hard-of-hearing learners. Input from subject matter experts, teachers, and members of the Deaf community is gathered to ensure cultural and linguistic appropriateness, particularly in the use of Filipino Sign Language (FSL).

Developing Phase. In this stage, the actual creation of the video materials takes place. This includes scripting, sign language interpretation, filming, and editing. The focus is on producing clear, engaging, and pedagogically sound content that aligns with identified subject areas. Visual elements, pacing, and sign clarity are carefully considered to support comprehension and retention.

Validation Phase. The final stage ensures the quality and effectiveness of the materials. Videos are reviewed by a panel composed of Deaf educators, language experts, and instructional specialists. Feedback is used to refine content, correct any inaccuracies, and confirm alignment with educational goals and FSL standards. Only validated materials are finalized for classroom or online use.

The evaluators rated the PSD E-Sign Library intervention at 4.61, indicating a Strongly Agree consensus, which suggests that this intervention is highly recommended as a learning resource to enhance the literacy and expressive signing abilities of DHH and adult learners.

4.3 Problem 3: What changes in sign language proficiency can be observed among key stage 1 learners, parents, guardians, and other stakeholders after implementing the PSD E-Sign Library?

A Post-test was conducted in order to measure the changes in the level of sign language proficiency of Key Stage 1 learners. The 50-item test was given with the results shown in Table 6.

Table 5. Results of PSD E-Sign Library Validation from the Stakeholders

Criteria	Evaluator				WM	INT
	1	2	3	4		
The contents of PSD E-Sign Library are …						
1. accurate and are based on the needs of its learners for Basic Sign Language	4	4	4	5	4.25	Agree
2. current and are based on the needs of its learners for Basic Sign Language	5	4	4	5	4.5	Strongly Agree
3. suited for the deaf and hard-of-hearing (DHH) learners	5	5	5	5	5	Strongly Agree
4. suited for adult hearing learners	4	5	5	4	4.5	Strongly Agree
The layout …						
5. makes it easy for the DHH learners to process graphics, text and sign language	4	5	4	5	4.5	Strongly Agree
6. of the PSD E-Sign Library intervention is consistent	4	4	5	5	4.5	Strongly Agree
7. is clear and logical	4	5	4	5	4.5	Strongly Agree
8. words and subtitles are clearly visible	5	4	5	5	4.75	Strongly Agree
Accessibility…						
9. The PSD E-Sign Library intervention accommodates the unique learning style of DHH pupils and adult learners.	4	5	4	5	4.5	Strongly Agree
10. The PSD E-Sign Library intervention can be utilized by the DHH and adult learners without much help from the teacher.	4	5	5	5	4.75	Strongly Agree
11. The PSD E-Sign Library intervention can be accessed in any type of computer and devices	5	5	5	5	5	Strongly Agree
Total:					**4.61**	**Strongly Agree**

Legend: WM – Weighted Mean; INT – Interpretation

Table 6. Mean Percentage Scores (MPS) of Post-Test of Key Stage 1 Learners

Grade Level	No. of Items	Average Post-Test Score	Mean Percentage Score (MPS)	Level of Proficiency
1	50	43.45	86.90%	Independent
2	50	45.14	90.28%	Independent
3	50	47	93%	Independent

Result of the Post-test shows mean percentage scores of 86.90%, 90.28%, and 93% of grades 1, 2, and 3, respectively. The results yielded under the Independent Level of Reading Proficiency. The result of the 100-item post-test of the adult learners is presented in Table 7.

Table 7. Mean Percentage Scores (MPS) of Post-Test of Adult Learners

Adult Learners	No. of Items	Individual Post-Test Scores	Mean Percentage Score (MPS)	Level of Proficiency
1	100	80	80%	Independent
2	100	91	91%	Independent
3	100	87	87%	Independent
4	100	90	90%	Independent
5	100	88	88%	Independent
6	100	79	79%	Independent
7	100	85	85%	Independent
8	100	99	99%	Independent
9	100	100	100%	Independent
10	100	90	90%	Independent

Result of the Post-test Shows that 10 out of 10 adult learners fall under Independent Reading Level.

4.4 Problem 4: What are the issues and challenges encountered in the implementation of the PSD E-Sign Library?

Table 8 encapsulates the comprehensive concerns, challenges, perspectives, and recommendations of many stakeholders regarding the execution of the PSD E-Sign Library intervention. It encompasses the qualitative data collected via focus group discussions and survey surveys.

Table 8. Issues, Challenges, Opinions, and Suggestion of the Stakeholders in the Implementation of the PSD E-Sign Library Intervention

Positive Feedback

- Good way to practice expressive sign language skills
- Basic vocabulary is very important for daily communication
- Video learning materials are beneficial to both learners and parents.

Perceptions/Suggestions

- Audio of the word may still be incorporated instead of music
- May include intermediate and advanced level vocabulary in the future

Stakeholders reported no notable issues or challenges during the implementation of the PSD E-Sign Library. On the contrary, the intervention was widely regarded as an effective and accessible tool that enhances the expressive sign language skills of both Deaf and Hard-of-Hearing (DHH) learners as well as adult users. It has proven particularly helpful in supporting daily and practical communication. Several users recommended the inclusion of audio features or pronunciation guides to benefit individuals with residual hearing, thereby increasing the tool's inclusivity. Additionally, there is a growing interest in expanding the E-Sign Library's content to include more advanced vocabulary relevant to specific domains such as education, religion, media, legal, and medical settings. This expansion aims to equip learners with the necessary linguistic tools to navigate diverse real-world environments confidently and competently.

4.5 Problem 5: Is there a significant relationship between parents' sign language proficiency and their child's academic performance?

The t-test results in Table 9 demonstrate the significant difference between the pre-test and post-test.

Table 9. T-Test Result on Finding the Significant Difference in the Means of the Key Stage 1 and Adult Learners Before and After the Utilization of the PSD E-Sign Library Intervention

Key Stage 1 Learners							
Variables Compared	**DF**	**MPS**	**Computed t-value**	**Critical t - value**	**Decision**	**P-Value**	**Impression @ 0.05 Level**
Grade 1							
Pre-Test (X_1)	10	10.18	33.24	1.81	Reject H_o	<0.001	Significant
Post-Test (X_2)		86.91					
Grade 2							
Pre-Test (X_1)	13	7.14	35.37	1.77	Reject H_o	<0.001	Significant
Post-Test(X_2)		90.29					
Grade 3							
Pre-Test (X_1)	10	30.73	16.60	1.81	Reject H_o	<0.001	Significant
Post-Test(X_2)		93.45					

Variables Compared	**DF**	**MPS**	**Computed t-value**	**Critical t - value**	**Decision**	**P-Value**	**Impression @ 0.05 Level**
Adult Learners							
Pre-Test (X_1)	10	28.6	9.58	1.83	Reject H_o	<0.001	Significant
Post-Test (X_2)		88.9					

The null hypothesis was rejected by the researcher, as the Grade 1 learners' computed t-value of 33.24 and critical level of 1.81 are significant at the 0.05 level. The null hypothesis was denied by the researcher once more, as the grade 2 participants achieved a computed t-value of 35.37 and a critical t-value of 1.77, both of which are statistically significant at the 0.05 level. In the grade 3 data, learners achieved a computed t-value of 16.60, while the crucial t-value was 1.81; consequently, the researcher rejected the null hypothesis, which is significant at the 0.05 level. The adult learners obtained a computed t-value of 9.58 and a crucial t-value of 1.83, leading the researcher to reject the null hypothesis. All of the respondents showed significant increase in their post-test after the PSD E-sign Library intervention. The results indicate a substantial enhancement in the sign language proficiency of Grade 1, 2, and 3 students, as well as adult learners, according to the notable increase in mean percentage scores.

5. Conclusions and Recommendations

In light of the findings and discussions derived from this study, the subsequent conclusions and recommendations proposed by the teacher-researcher are as follows:

1. The intervention program called PSD E-Sign Library is an effective intervention in improving the literacy and sign language skills of Key Stage 1 learners and adult learners.
2. Stakeholders rated the effectiveness and applicability of the PSD E-Sign Library regarding content, layout, and accessibility as strongly agree, indicating a high level of acceptance of the intervention as an online learning resource to enhance the literacy and sign language skills of Key Stage 1 learners and adult learners.
3. The PSD E-Sign Library was successfully implemented for Grades 1, 2, and 3 and adult learners, as evidenced by the results of the pre- and post-tests. Additionally, it was noted that the learners sign as they view the multimedia intervention's content, which is comparable to reading the words orally.
4. The established PSD E-Sign Library intervention is highly suitable and is recommended for use as an educational resource for DHH and adult learners in enhancing their literacy and sign language competencies.
5. PSD E-Sign Library requires enhancements to incorporate emerging variations of Filipino Sign Language used across the Deaf community throughout the entire Philippine archipelago. Therefore, in order to be cognizant of the other sign variations, it is advisable to establish a close working relationship with them.
6. This study has the potential to establish a standard for future research in the Philippines that pertains to the field of deaf and hard-of-hearing education.
7. Additional analogous research may be conducted to mitigate the identified shortcomings of this study.

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