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Leveraging visual media to improve articulation skills in children with hearing impairments

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Abstract

Background: Early childhood is a critical period for language and communication development. Deaf children often face significant challenges in acquiring articulation skills due to hearing impairments, which impact their ability to communicate effectively. Despite various interventions, there remains a need for effective, evidence-based strategies to support these skills.

Aim: This study aims to evaluate the effectiveness of picture media in improving articulation skills in children with hearing impairments. By focusing on articulation rather than broader language skills, this research addresses a gap in existing literature.

Method: A qualitative approach was employed, involving observations, interviews, and documentation to collect data over six months. The study analyzed changes in articulation skills in a deaf child before and after interventions using picture media. Instruments included standardized articulation tests and feedback from parents and teachers.

Result: Findings reveal that picture media significantly enhance articulation skills, enabling children to associate sounds with visual cues effectively. Specific improvements were observed in the pronunciation of vowels and consonants, with gradual progress in constructing syllables and words. Unlike prior studies that primarily explore vocabulary development or general communication in deaf children, this research uniquely focuses on the direct impact of picture media on articulation skills. The study offers evidence-based insights for developing targeted educational interventions for children with hearing impairments.

Conclusion: This study confirms the importance of using visual media, especially pictures, in the learning of children with hearing loss. This approach is not only effective in improving articulation skills but also supports children's optimal communication potential. Thus, picture media can be an important tool in inclusive education for deaf children.

INTRODUCTION

Early childhood is a critical stage for physical, cognitive, and socioemotional development. During this period, children develop the foundational skills necessary for communication and learning. However, this stage often presents significant challenges for children with special needs, particularly those with hearing impairments. Articulation, a key component of communication, is frequently underdeveloped in deaf children because of their limited auditory input, which restricts their ability to accurately distinguish and reproduce sounds. According to recent global statistics, approximately 34 million children experience

disabling hearing loss, emphasizing the urgent need for targeted educational strategies to address their developmental needs (Ogino, 2021; Vishnu et al., 2021; Wardhani, 2023).

Despite the availability of assistive technologies, such as hearing aids and cochlear implants, many children with hearing impairments continue to face difficulties in articulation, which adversely affects their academic performance and social interactions. Existing interventions such as speech therapy often emphasize broader language acquisition without adequately addressing the specific challenges of articulation. Moreover, traditional teaching methods lack the visual stimuli necessary to engage and support deaf learners. These gaps necessitate innovative approaches tailored to the unique needs of children with hearing impairment(Azzam Khan, 2022; Choudhry et al., 2021; Meinzen-Derr et al., 2020a, 2020b).

The right to education for children with special needs is explicitly regulated in Law No. 20/2003 of the National Education System. Article 5, Paragraph 2, states that people with physical, mental, intellectual, or social disabilities have the right to education with a special curriculum. In addition, Article 32, Paragraph 1 explains that the special curriculum is designed to help students who face developmental barriers due to these disorders while accommodating their potential intelligence and special talents(Nur Yanah, 2024).

This regulation guarantees that every individual, including children with special needs, has the right to have equal education. It is a challenge for educators to provide special attention and approaches to children with special needs, especially deaf children. Deaf children often experience barriers to learning language and speech, which are basic communication skills. This difficulty has a direct impact on students' ability to understand the subject matter presented in class (Hall et al., 2019a; Kadir, 2021).

Deafblindness requires a more complex approach to education as a form of special need. Difficulties in acquiring language skills cause deaf children to have limited vocabulary, which in turn can hinder their ability to understand the reading material. This condition not only affects academic comprehension but also impacts students' ability to interact socially and develop personal potential.

Based on observations, a child was found to be hearing-impaired at the age of 4 years. Since infancy, the child had good health with normal motor and visual development. However, there is a significant delay in speech development. The parents initially considered the child to have a speech delay, as the child had not been able to speak until the age of two. As a follow-up, occupational therapy and speech therapy were conducted, but did not provide adequate results. At the age of 4 years, Brainstem Evoked Response Audiometry (BERA) test results showed a disorder in the cochlea of the ear, which was the main cause of speech delay. After the child started wearing the hearing aids, there were many positive changes, and the child started learning to speak despite relying on gestures to communicate, which often led to misunderstanding(Gifford, 2020; Wisnu et al., 2021; Sahli, 2019).

To overcome these obstacles, articulation training is an effective approach for treating children with hearing loss. Articulation training aims to identify, understand, and improve speech sounds to match the intended sounds so that communication can occur more effectively. This method is important to help children understand the differences in sounds and to produce clearer and more meaningful sounds. Articulation training is also an important step in facilitating verbal communication skills in children with hearing impairment(Saptari et al., 2022).

One of the tools that supports the implementation of articulation training is visual media, such as pictures. Picture media can be an effective tool for visually introducing certain sounds and providing stimuli to support children's understanding of the concept of speech. Pictures provide a concrete representation of spoken words or sounds, making it easier for children to

associate sounds with meaning. This method can also improve the focus and attention of the children during training(Choi et al., 2019; Naz et al., 2023).

Studies have shown that visual media, including pictures, can help improve learning effectiveness in children with hearing impairment. By using pictures as part of articulation training, children are not only able to recognise certain sounds but also learn to understand the context in which words are used in everyday communication. This is important to support vocabulary development, which is the foundation of language learning (Garvis et al., 2021; Jabar & Ahmad, 2018; Young et al., 2020).

In the case of children with hearing impairment, articulation training integrated with visual media not only helps improve speaking skills, but also strengthens children's confidence in communication. Hearing aid support combined with appropriate training methods can accelerate language acquisition in children with hearing loss. This approach not only improves articulation skills, but also supports children to be more active and involved in the learning process, both at home and in the school environment.(Czap et al., 2019; Jabar & Ahmad, 2018).

Previous research has shown that visual media, such as pictures, has a positive impact on improving articulation and language skills in children with hearing loss. The use of visual media such as pictures has long been a focus of research in the education of children with special needs, especially deaf children. In 2013, research conducted by Intan Mara Mutiara showed that visual communication media can improve receptive language in deaf children by enabling them to better understand and process language information. This research provides an important basis for the benefits of visual media in the context of language development.(Mutiara, 2013).

Furthermore, in 2015, Sri Sugiarti's research at SLB Negeri Surakarta showed that the use of picture variations could significantly improve the vocabulary of deaf students. The researcher noted that the children were better able to understand and remember new words when using the visual aids. These results confirm the effectiveness of visual media in supporting the learning process(Sugiarti, 2015).

In 2017, Nur Afiffah and Tjutju Soendari conducted research at SLB B-C YPLAB Bandung City. Their research showed that picture media helped moderately disabled children to pronounce words better. This study expands our understanding of the benefits of visual media in the context of children with different types of special needs, including tunagrahita.

Research in 2018 by Alfitri, Iswari, and Kasiyati at SLB Restu Ibu Bukittinggi showed that the use of picture-word media can increase the vocabulary of deaf children in pronouncing nouns. The baseline conditions showed an ability of 20%, which increased to 70% in the intervention conditions and 80% in the second baseline condition. These results show that picture word media is effective in improving vocabulary skills.(Alfitri et al., 2018).

Recent research by Kadir shows that concrete picture media can make learning more interesting and arouse deaf students' interest in it. This high learning motivation encourages increased student engagement, which in turn supports the development of their vocabulary and speaking skills (Kadir, 2021).

In 2021, Andre Maulana examined the use of image media in learning for children with autism at SLBN Praya. The results of this study show that picture media not only improves the communication skills of children with autism but also attracts attention to learning. This research confirms that picture media can be used for various groups of children with special needs with positive results.(Maulana, 2021).

Previous studies have predominantly focused on the role of visual aids in vocabulary development and reading comprehension among children with hearing impairment (Garvis et al., 2021; Sugiarti, 2015). Few studies have investigated the direct impact of visual media on articulation skills. Furthermore, most existing studies adopt qualitative or descriptive methodologies, limiting the empirical evidence needed to substantiate the effectiveness of picture media for this specific purpose. This gap calls for targeted research to quantitatively evaluate the impact of picture media on articulation.

This study aims to bridge this gap by providing empirical evidence of the effectiveness of picture media in improving the articulation skills of deaf children. Impact of picture media on the articulation skills of children with hearing impairments. By identifying measurable improvements in sound production and phoneme recognition, this study seeks to provide a robust foundation for integrating picture media into inclusive education frameworks.

METHODS

This study utilized a qualitative approach to comprehensively understand the phenomena experienced by children with hearing loss, particularly in behavior and perceptions related to articulation skills. A qualitative approach was selected because it aligns with the research objectives to explore in depth and contextually the impact of picture media on articulation development. This permits detailed observation and interpretation of natural situations, resulting in rich descriptive data relevant to understanding the unique experiences of children with special needs.

The study was conducted over a period of six months at the RA Khalidya, Bandung Regency. The sole participant was a deaf child (Ha) who met the specific inclusion criteria. These criteria included a diagnosis of hearing loss (hearing ability of 40 dB based on a Brainstem Evoked Response Audiometry test), use of hearing aids in daily communication, and participation in an inclusive early childhood education institution. The primary data was obtained through direct observation of the participants' articulation skills, while additional data were collected through semi-structured interviews with parents and teachers and a review of relevant documents such as developmental history and academic records.

The instruments employed included an observation guide derived from the book "Speech Development for Children with Special Needs" by Dr. Endang Purbaningrum, picture media in the form of picture cards with writing and movement on the back side, semi-structured interviews with parents and teachers, and other supporting documents.The data collection process consisted of four stages, namely: First, there was pre-fieldwork, which included preparation, focus determination, and licensing. Second, the fieldwork included observations during classroom activities and individual sessions with Ha. Third, interviews were conducted periodically to understand the changes in articulation skills from the perspectives of parents and teachers. Finally, document collection is used to strengthen the context of the findings.

The analysis was conducted iteratively using the following steps: data reduction, categorization, triangulation of data from various sources, and interpretation. Data obtained from observations, interviews, and documents were grouped into main themes such as phoneme recognition, syllable articulation, and increased confidence in communication. The results of this analysis were then interpreted with reference to the relevant literature to highlight new findings. This methodological approach offers a comprehensive examination of the efficacy of visual media in enhancing the articulation abilities of deaf children, thereby making significant theoretical and practical contributions to inclusive education.

RESULTS AND DISCUSSION

A. Result

Initial condition of articulation ability in children with hearing impairment

RA Khaidya is an early childhood education institution that also serves children with special needs, including Ha, a student with hearing loss. Ha has good cognitive and social-emotional skills, but his hearing impairment sometimes hinders his full potential, so he uses hearing aids to support his daily communication activities. Based on observations, Ha shows great interest in the pictures on the walls and whiteboards of the classroom. In response, the teacher has made a conscious effort to incorporate picture media into every learning session, recognizing its potential to enhance engagement and comprehension.

The observations were conducted by the researcher using instruments from the book "Speech Development for Children with Special Needs" by Dr. Endang Purbaningrum, M.Kes., which is designed to evaluate the articulation skills of children with special needs.The observation results indicated that Ha's articulation organs, including lips, tongue, and jaw, functioned adequately. While demonstrating competence in following various instructions related to the position and movement of his articulation organs, "Ha" exhibited specific limitations, particularly in the rolling and rounding of his tongue during the production of certain sounds. This limitation affects Ha's ability to pronounce specific phonemes, necessitating specialised support and practice. During the learning process, picture media served as the primary tool to facilitate Ha's comprehension of the relationship between sounds and visual concepts.

The media employed included visually engaging picture cards with vibrant colors, supplemented by writing and gestures that provided supplementary context. Each learning session was meticulously structured, commencing with introductory activities such as prayers and movement-based songs, followed by the core exercises focusing on picture recognition and articulation. "Ha" demonstrated positive responses, including focused attention on the pictures and attempts to replicate the sounds articulated by the instructor.

While these observations are descriptive, they reveal the great potential of using picture media to improve Ha's articulation skills; however, these findings still require more in-depth statistical and thematic analysis to more accurately describe the impact of picture media on the articulation development of children with hearing loss and provide valuable insights for the development of more effective inclusive learning strategies(Rony et al., 2024).

Table 1. Phoneme Ability Test Sheet

No.	Phonemes	Phoneme Position in the Word						Total
		Initial	Value	Middle	Center Value	End	Final Grade	Value
1	a	Fire, root, ash, chicken, apple	C, C, C, K, K	Bag, suit, satay, tie, cow	C, C, B, C, K	Pipe, Horse, Ribbon, Eye, Sheep	B, C, K, C, K	
2	i	Mom, it's	C, C	Ribbon, Pipe	C, K	Ties, Legs	C, C	
3	u	Money, Shrimp, Caterpillar	B, B, C	Fruit, Sugar, Horse	C, B, B	Book, Guava, Stone	B, B, B	

4	e	Bucket, Tail, Elegant	B, K, K	Tomorrow, Sedan, Betet	K, C, C	Ginger, Chili, Satay	C, C, C
5	o	Torches, People	B, K	Donuts, Cars	C, C	Bobo, Meatballs	B, B

The results of the Phoneme Ability Test, which utilizes vowels, demonstrate the students' articulation proficiency in the initial, medial, and final positions of words. This evaluation instrument assesses the students' ability to pronounce specific sounds accurately by examining multiple phonemes.The subsequent table presents the words employed for each phoneme, along with the students' proficiency scores at each phoneme position.

For the phoneme “a”, students demonstrated a high level of proficiency, particularly in the initial position of words such as fire, root, and ash, where they received a “C” (good enough). In words like bag and suit, which had a middle position, students still obtained a “C.” However, in words with the final position, such as pipe and horse, students received scores that varied between “B” (good) and “K” (poor).

For the “i” phoneme, the test results revealed some difficulties. In the initial position of the word, as in mom and it's, students can pronounce it with a grade of “C”. However, in the middle position, such as ribbon and pipe, students received a “K” (less). In the final position, words such as warranties and “ties” and “legs” were pronounced with a consistent “C” grade. The phoneme “u” demonstrated more stable performance, with “B” (good) grades in the initial position, as in “money,” “shrimp,” and “caterpillar.” In the middle position, words like “fruit” and “sugar” also received commendable scores, with a mix of “B” and “C” grades. In the final positions, such as book and guava, students demonstrated consistent performance with a “B” grade. However, challenges have emerged for the “e” phoneme. In the initial position, for example, in bucket, tail, and elegant, students obtained “B” and “K” grades. In the middle position, as in tomorrow and sedan, the results were slightly better with “K” and “C” grades. In the final position, such as “ginger” and “chili,” students demonstrated notable improvement, achieving a “C” grade. The “o” phoneme exhibited a range of outcomes. In the initial position, for example, in “torches” and “people,” students received a “B” and “K.” In the middle position, such as in “donuts” and “cars,” students' scores stabilized at a “C.” In the final position, for instance, in “bobo” and “meatballs,” students performed remarkably well, achieving a “B.”

Table 2. response sheet

RESPONSE SHEET				
Age	Target Vote	Initial	Middle	End
3 th	P	K	K	K
	B	B	C	C
	H	B	B	B
	T	C	B	B
	D	B	B	C
3.5th	K	B	B	C
	G	C	B	C
	NG	-	-	C
4th	F	K	-	K
	V	K	-	-

From the table, the phonemes that are less clearly pronounced by students are the letter “P” at the beginning, middle, and end of words; the letter “F” at the beginning and end of words; and the letter “V” at the beginning of words. The phonemes that are quite clearly pronounced include the letter “B” in the middle and end of words; “T” at the beginning of words; “D” at the end of words; “K” at the end of words; “G” at the beginning and end of words; and “NG” at the end of words. Meanwhile, the pronunciations of phonemes that are already good are the letter “B” at the beginning of the word; “H” at the beginning, middle, and end of the word; “T” in the middle and end of the word; “D” at the beginning and middle of the word; “K” at the beginning and middle of the word; and “G” in the middle of the word.

From the interviews with the parents, it was found that the last hearing test showed hearing ability at 40 dB, while normal hearing was 20 dB, indicating mild to severe hearing impairment. The child was diagnosed with ADHD; however, the test results were negative. After the BERA test, it is recommended that the child wear a hearing aid (ABD) to improve their hearing. Without an ABD, the child can still hear the door knocks and horns.

At home, the child is using the word “want” fluently and is learning to add subjects such as “sister want” or “mom want.” The child still has difficulty distinguishing between “want” and “smell” due to the similarity of the sounds of the letters “m” and “p.” Although they can say the word “papa,” the child is not yet able to pronounce the “P” at the end of the word, for example in the word “roof.” The pronunciation of the letters “I” and “e” is also still difficult, especially in making sounds. The child is not introduced to cell phones, but observes people around him using cell phones.

Picture media applied to the articulation ability of children with hearing impairment

The picture media used in this study were in the form of picture cards equipped with various kinds of pictures and writing, and there were also gestures on the back of the card. This picture uses colors that attract the students' attention. The picture cards used were as follows:

The images provided are as follows.

Development of articulation skills in children with hearing impairment through picture media

In addition to providing stimuli through communication, picture media are used daily to introduce new words. Every day, learning involves several activities, including preparation, initial (praying), core (providing materials), and closing. The details of the activities and descriptions of students' responses when using picture media are as follows.

Before learning, students were conditioned to learn with their friends. Initial activities included praying together and singing while moving. Ha followed the movements happily, but did not sing. In the core activities, the teacher provides fine motor and language stimuli. Ha focused on the drawing activity, but only briefly on language stimuli. When looking at the pictures on the wall, Ha is happy, but has not been taught specifically. The closing activity is a prayer, and Ha follows hand movements(Adesina et al., 2023).

Before learning, students were conditioned to learn with their friends. Initial activities included praying together and singing while moving. Ha followed the movement happily, but did not sing. In the core activity, the teacher placed pictures on the wall and Ha was more focused when separated from his friends. Ha enthusiastically pointed to the picture and the teacher said the name of the picture. The closing activity is a prayer together; Ha follows hand movements and watches the teacher's lips.

Before learning, students were conditioned to learn with their friends. Initial activities included praying together and singing while moving. Ha followed the movement happily, but did not sing. In the core activities, Ha showed curiosity towards picture cards and could pronounce vowels. Ha can say “A” when he sees pictures of ducks, cars, and balls. The closing activity is a prayer, and Ha follows hand movements. The teacher provided a free drawing activity after the lesson.

Before learning, students were conditioned to learn with their friends. Initial activities included praying together and singing while moving. Ha followed the movement happily, but did not sing. In the core activities, Ha was able to make sounds of the first two letters of the name of objects such as “be,” “mo,” and “bo.” The learning was performed individually. The closing activity is a prayer, and Ha follows hand movements. The teacher gave Ha a favorite picture to boost his spirit.

Before learning, students were conditioned to learn with their friends. Initial activities included praying together and singing while moving. Ha followed the movement happily, but did not sing. In the core activity, Ha was able to say the name of the object, although this was

not clear. The closing activity is a prayer, and Ha follows hand movements. The teacher separated Ha from his friends to improve focus.

B. Discussion

Hearing loss significantly affects language development in deaf children because hearing aids do not function optimally, thereby hindering communication. In communication, proper pronunciation and speech are essential for the message to be conveyed properly. One of the main causes of hearing loss is speech difficulties, which is an important skill for children, both at school and in everyday life. Although deaf children's pronunciation organs may function properly, they often have difficulty correctly pronouncing vowels and consonants. These difficulties are influenced by a variety of factors related to the speech process, including tactile, motor, and physical, mental, and ecological factors(Gordon et al., 2015; Pimperton & Kennedy, 2012; Shim et al., 2018)..

Physiological factors are related to the function of the organs involved in speech and language, which helps children develop these skills. Mental factors include elements such as interest, comprehension, commitment to what they hear and see, and the motivation to interact with others. Ecological factors include the family environment, which greatly influences a child's discourse and language development in the early years of life. A stable and supportive family environment is essential for deaf children's language development(Dall'asen & Pieczkowski, 2022; Ridgeway, 2021; Sutton-Spence, 2021)..

Research shows that the use of picture media can bring positive changes to the articulation skills of deaf children. First, children only pay attention to the pictures shown by the teacher and watch the teacher's lips when giving examples of pronunciation of the name of the picture. Over time, the child became more interested and began to imitate the teacher's lips and pronounce vowels such as "a." At the next meeting, the child began to pronounce syllables such as "be," "mo," and "bo." Challenges in hearing and speaking make deaf children more dependent on visual skills for communication and learning. Therefore, image-based media can help maximize visual potential.

The factors that support deaf children's learning include a conducive learning environment. Deaf children tend to be better able to follow classical learning activities if their learning environment is supportive. However, to develop articulation skills, children need to be in a room with minimal distractions or alone with the teacher so that they can focus on the given directions. The use of interesting, clear, and colorful picture media is also very important for accommodating students learning needs. In addition, providing rewards when children start to get bored, such as giving time to draw freely after following the teacher's directions, can help maintain children's motivation.(Deocampo et al., 2018; Hall et al., 2019; Sari & Zarkasih Putro, 2021).

Internal factors related to the teacher's ability to explain and present material through the chosen media, as well as external factors such as classroom conditions, layout, type of media, and effective organization, all play an important role in supporting deaf children's learning. With the right approach, deaf children can develop better communication skills even though they face challenges in hearing and speech.

The findings of this study have considerable **implications** for the development of early childhood education policies and practices, particularly in the context of children with hearing impairments. The results of this study demonstrate that picture media can be an effective tool for enhancing the articulation abilities of children with hearing impairment. In light of these findings, it is recommended that drawing media be integrated into the curriculum and learning strategies of inclusive education for children with special needs. This approach can facilitate

the creation of a more inclusive learning environment and support optimal child development. Furthermore, training in the utilization of picture media can be recommended as a component of teacher and parent training programs with the objective of enhancing their abilities to assist children in surmounting communication obstacles. In practice, incorporating visual media into the learning process can enhance the efficacy of educational interventions, particularly for children who encounter difficulties in pronunciation and communication.

This study makes **a significant contribution** to the field of inclusive education, particularly regarding the use of visual media to assist children with special needs. This study differs from previous research in that it specifically examined the impact of picture media on articulation skills, whereas previous studies tended to focus on vocabulary development or reading skills. This study provides new insights into the effectiveness of visual approaches in supporting the speaking skills of deaf children. The findings also confirm the importance of an evidence-based approach in the development of special needs education curricula, and can serve as a basis for the development of other visual aids in the future..

A limitation of this study is the relatively small sample size, which may not be fully representative of the deaf child population as a whole. Furthermore, the study was conducted in a single location, which restricts the generalizability of the findings to broader areas or contexts. The research methods employed were predominantly qualitative, precluding a more comprehensive quantitative assessment of the extent of improvement in articulation skills. Furthermore, the absence of a control group in this study may compromise the validity of the conclusions drawn regarding the efficacy of picture media. Future **research** should consider using a larger and more diverse sample to increase the generalizability of the findings. A randomized controlled trial design could be implemented to provide stronger evidence regarding the effectiveness of picture media. Furthermore, an investigation into the long-term consequences of employing picture media on deaf children's articulation abilities could be conducted to ascertain the durability of the advantages of this intervention. Subsequent research could also examine alternative visual media, such as animation or digital technology, to evaluate their efficacy in comparison to traditional picture media. Consequently, more comprehensive research could facilitate the formulation of more adaptive and innovative educational strategies for children with special needs.

This study highlights the potential of picture media as an effective educational tool for improving articulation skills among deaf children. The findings suggest the integration of visual media into early childhood education policies, particularly for inclusive classrooms. Teachers and parents can utilize such tools to bridge communication barriers, ultimately fostering a supportive environment that enhances language acquisition and social engagement. The study also underscores the importance of creating specialized curricula that address the unique needs of children with hearing impairments, paving the way for more inclusive education systems.

The research provides a novel perspective on the use of picture media in addressing articulation challenges among deaf children. By focusing specifically on phoneme recognition and sound articulation, this study fills a critical gap in existing literature, which often emphasizes vocabulary development or general language skills. Furthermore, the evidence-based approach offers practical insights for educators and policymakers, supporting the development of targeted teaching strategies and materials that enhance learning outcomes for children with special needs.

Despite its contributions, the study is limited by its small sample size, which restricts the generalizability of its findings. The single-location research context also limits its applicability to diverse settings. Additionally, the qualitative methodology employed, while providing rich descriptive data, lacks the statistical rigor to substantiate broader claims. The absence of a

control group further diminishes the strength of causal inferences drawn about the efficacy of picture media.

To build on these findings, future studies should adopt larger and more diverse sample sizes to enhance the generalizability of results. Employing mixed-method or quantitative approaches, such as randomized controlled trials, can provide more robust evidence of the impact of picture media on articulation skills. Investigations into the long-term benefits of this intervention could also offer valuable insights into its sustainability. Exploring alternative visual tools, including animations and digital technologies, could further expand the scope of adaptive educational strategies for children with special needs.

CONCLUSION

This study underscores the efficacy of employing picture media to enhance the articulation skills of deaf children. Utilising a qualitative approach encompassing observations and interviews, this study demonstrates that picture media assists children with hearing loss to recognise, comprehend, and articulate specific phonemes more accurately. Children who utilised this media exhibited substantial advancements in the pronunciation of words and phonemes compared to their initial baseline conditions. The findings further substantiate that visual media, particularly pictures, not only fosters children's verbal expressions, but also elevates their self-assurance in communication. This study makes a novel contribution to the field of inclusive education by offering an evidence-based approach to support language development in deaf children. Nonetheless, this study has some limitations, including a small sample size and qualitative methods that lack the depth of quantitative measures. The study's recommendations include the integration of picture media into the inclusive education curriculum, and the training of teachers and parents in the effective utilisation of visual media. To enhance the efficacy of adaptive education strategies for children with special needs, further research is recommended that employs stronger control designs and explores additional visual media, such as animation or digital technology.

OUTHOR CONTRIBUTIONS STATEMENT

EM conceptualized the study, designed the methodology, and led data collection and analysis. SEY conducted the literature review, developed the theoretical framework, and contributed to the interpretation of findings. NP supported the implementation of the intervention, facilitated classroom activities, and ensured the practical application of picture media. All authors collaborated in drafting, reviewing, and revising the manuscript, ensuring its alignment with academic standards. EM., SEY., and NP. worked together to address reviewer feedback and refine the final version. Each author approved the final manuscript and takes shared responsibility for the integrity and accuracy of the research.

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