

Strategies for Enhancing the Pedagogical Competence of Special Education Teacher Candidates in Early Reading Instruction for Hearing-Impaired Students

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ABSTRACT

The acquisition of foundational literacy skills presents a critical challenge for students with hearing impairments, a difficulty often exacerbated by teacher preparation programs that neglect the specialized training necessary for practical competency. This study aims to bridge this pedagogical gap by exploring and validating specialized instructional strategies designed to strengthen the competence of prospective special education teachers in delivering effective early literacy instruction. Utilizing a qualitative descriptive design, the investigation involved six prospective teachers from Universitas Negeri Jakarta and ten hearing-impaired students. Data triangulation was employed through systematic classroom observations, semi-structured interviews, literacy assessments, and the analysis of teaching artifacts. Findings reveal substantial advancements in both educator competence and student outcomes; specifically, teacher candidates demonstrated a 60% increase in teaching confidence and a notable 140% improvement in applying Total Communication and Reflective Maternal Methods (RMM). These pedagogical shifts correlated with significant student achievements, evidenced by a 100% to 200% increase in vocabulary acquisition, alongside enhanced alphabetic recognition and decoding skills. The novelty of this research lies in identifying the vital correlation between emotional scaffolding via RMM and lexical expansion, positioning emotional connection as a critical psychological dimension in special education pedagogy. Additionally, it contributes a validated multimodal framework integrating visual phonics and sound-rhythm perception to bridge auditory gaps. Directly supporting Sustainable Development Goal (SDG) 4, this study addresses the identified pedagogical deficit by demonstrating that integrating evidence-based, multimodal methodologies into teacher preparation significantly enhances instructional quality. Consequently, it advocates for curriculum reforms to ensure equitable, quality education for students with hearing impairments.



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A. INTRODUCTION

Developing effective early literacy programs for students with hearing impairments remains a persistent and complex challenge within special education contexts (Fitas R., 2025). Literacy competence serves as a fundamental determinant of academic success, and failure to acquire early reading skills at the initial stages can lead to long-term educational disadvantages for learners with hearing impairments (Mushtaq et al., 2024). Empirical evidence indicates that these students frequently demonstrate significantly lower literacy achievement compared to their hearing peers, with delays in vocabulary acquisition and decoding skills reaching up to two to three years behind expected developmental benchmarks (Sajewicz-Radtke et al., 2025). In Indonesia and comparable contexts, existing reports further reveal that a considerable proportion of hearing-impaired students struggle to meet minimum literacy standards at the

primary level, underscoring a critical gap in instructional effectiveness (Kendrick et al., 2022). Despite this urgency, teacher preparation programs often fail to equip prospective educators with the specialized competencies required to address these challenges effectively (Petrocchi-Bartal et al., 2025). This inadequacy is particularly concerning, as hearing-impaired learners require instructional approaches that go beyond conventional methods and incorporate visual, tactile, and multimodal communication strategies (Bryce, T. G. K., & Blown, E. J., 2024).

The importance of addressing this competency gap is reinforced by growing recognition that early literacy intervention plays a crucial role in improving academic outcomes and facilitating social and educational inclusion for students with hearing impairments (Mursita et al., 2025). Prior studies have shown that well-designed early literacy programs can significantly enhance language development and reading abilities (Hidayatullah et al., 2023). However, despite these promising findings, teacher preparation curricula frequently lack targeted training that addresses the unique linguistic and cognitive needs of hearing-impaired learners (Chalise, 2024). As a result, many prospective teachers enter the classroom without sufficient practical skills or adaptive strategies, limiting their effectiveness in supporting students' literacy development (Xia et al., 2025).

Although a substantial body of literature has explored literacy instruction strategies, a significant gap remains in studies focusing on how pedagogical competence is developed among prospective special education teachers in this specific context (Meutia & Mursita, 2018). Existing research tends to emphasize student outcomes rather than the process of preparing teachers to implement appropriate instructional approaches (Latifah et al., 2023). Moreover, many studies rely on generalized frameworks or theoretical perspectives, which often fail to capture the complexities of real classroom practice. Instructional approaches such as Total Communication and visual phonics have been widely acknowledged as effective; however, they are frequently examined in isolation, resulting in a fragmented understanding of how these strategies can be integrated into a cohesive teaching framework (O'Brien et al., 2024).

In addition to these limitations, previous studies have largely overlooked the affective dimension of teaching, particularly the role of emotional connection in literacy learning (Aldrup et al., 2024). While cognitive and linguistic aspects have been extensively studied, the integration of emotional scaffolding such as reflective maternal approaches remains underexplored, especially in the context of hearing-impaired students (Fang, Y., & Yin, G., 2025). This omission is significant, as emotional engagement has been shown to play a critical role in enhancing motivation, participation, and vocabulary acquisition (Hidayatullah et al., 2023). Furthermore, research on teacher preparation highlights the importance of field experiences but provides limited insight into how specific instructional strategies can be systematically practiced, evaluated, and refined within authentic teaching contexts (Petrocchi-Bartal et al., 2025). Consequently, there is a lack of empirical evidence demonstrating how pedagogical competence develops through the application of integrated instructional approaches in real classroom settings (Mursita, Winarsih, Bintoro, Jaya, et al., 2025).

Addressing these gaps requires a more comprehensive and practice-oriented approach that not only integrates multiple instructional strategies but also considers both cognitive and affective dimensions of learning. In this regard, several approaches have been identified as particularly relevant, including visual phonics, perception of sound and rhythm, reflective maternal methods, and Total Communication. These strategies offer complementary strengths: visual phonics supports phonological awareness through visual representation, rhythm-based approaches facilitate linguistic pattern recognition,

reflective maternal methods enhance emotional engagement, and Total Communication enables multimodal interaction through sign language, gestures, and speech. However, the effectiveness of combining these approaches within a unified instructional framework remains insufficiently explored.

Based on these limitations, a clear research gap emerges, namely the absence of empirical, classroom-based studies that examine the integration of cognitive, linguistic, and emotional strategies within a single framework to strengthen the pedagogical competence of prospective special education teachers. To address this gap, the novelty of this study lies in its integrative and holistic design. Methodologically, this research adopts a qualitative descriptive approach enriched with pre–post assessment data, enabling a comprehensive analysis that captures both instructional processes and measurable learning outcomes. In terms of instructional design, this study integrates Total Communication, perception of sound and rhythm, and reflective maternal methods into a unified multimodal framework, moving beyond the fragmented approaches commonly found in previous research. Additionally, this study employs systematic observation protocols, validated literacy assessment instruments, and teaching artifact analysis to examine both teacher competence development and student literacy progress in a structured and evidence-based manner.

Therefore, this study aims to identify and analyze effective multimodal instructional strategies for early reading instruction in hearing-impaired students, to examine how the integration of these strategies enhances the pedagogical competence of prospective special education teachers, and to evaluate their impact on students' literacy development, particularly in vocabulary acquisition and decoding skills. By integrating instructional and affective dimensions within an empirical classroom-based framework, this study is expected to contribute a more comprehensive and practical model for improving teacher preparation programs and addressing persistent literacy challenges among students with hearing impairments.

B. METHODS

RESEARCH DESIGN AND APPROACH

This investigation implements a qualitative descriptive research framework to examine instructional methodologies utilized by prospective special education teachers for strengthening their pedagogical capabilities in delivering early literacy instruction to hearing-impaired student populations. The research emphasizes analyzing knowledge acquisition, instructional competencies, and practical implementation strategies employed by prospective educators throughout their teaching practicum experiences. The study concentrates specifically on classroom interaction dynamics with hearing-impaired learners, exploring how specialized instructional approaches influence both educator competence development and student literacy achievement outcomes.

PARTICIPANT SELECTION AND CONTEXT

The research encompasses 6 prospective special education teachers and 10 hearing-impaired students participating in early childhood education (TK) and elementary school (SD) educational contexts. Prospective teachers were recruited from the special education teacher preparation curriculum at Universitas Negeri Jakarta, ensuring participants possessed foundational knowledge in special education pedagogy. The hearing-impaired student participants were selected from a local special education institution (SLB) specifically serving learners with hearing impairments, representing diverse hearing loss severity levels and literacy proficiency stages.

DATA COLLECTION INSTRUMENTS AND PROCEDURES

Data acquisition employed multiple collection methods to ensure comprehensive investigation of the research phenomena:

1. **Classroom Observation Protocols:** Systematic observations transpired throughout prospective teachers' instructional practice sessions, specifically documenting their implementation of reflective maternal methodologies, perception of sound and rhythm communication techniques, and Total Communication frameworks. Observation protocols concentrated on understanding how these specialized methodologies facilitate early literacy skill development among hearing-impaired student populations, capturing instructional delivery techniques, student engagement patterns, and adaptive teaching modifications.
2. **Semi-Structured Interview protocols:** Interview protocols were administered to prospective teachers preceding and following their instructional practice sessions to evaluate their comprehension of employed methodologies, self-perceptions regarding pedagogical capability development, and challenges encountered when delivering literacy instruction to hearing-impaired learners. Interview questions addressed their confidence levels, strategy implementation experiences, and reflective insights regarding instructional effectiveness.
3. **Student Literacy Assessment Tools:** The literacy capabilities of hearing-impaired students underwent systematic evaluation preceding and following the instructional intervention period to quantify improvements in early literacy competencies. Assessment instruments concentrated on measuring students' capacity to recognize alphabetic characters, decode lexical items, comprehend elementary texts, and demonstrate vocabulary acquisition. These evaluations provided quantifiable evidence of instructional strategy effectiveness.
4. **Teaching Artifact Documentation:** Comprehensive analysis of lesson blueprints, instructional resources, and reflection documentation produced by prospective teachers enabled understanding of instructional methodology implementation processes and modifications executed to address individualized requirements of hearing-impaired students. These artifacts revealed planning processes, material adaptations, and reflective practice development.

ANALYTICAL FRAMEWORK AND PROCEDURES

The acquired data underwent systematic analysis utilizing thematic analysis procedures, concentrating on identifying recurring patterns and themes throughout different data sources. The analytical framework emphasized four primary thematic areas: implementation of reflective maternal approaches and their influence on student participation and vocabulary acquisition; efficacy of perception of sound and rhythm communication in facilitating hearing-impaired students' comprehension of linguistic patterns and early literacy competencies; utilization of Total Communication methodologies and their facilitation of multimodal learning experiences for hearing-impaired populations; and cultivation of pedagogical competence among prospective teachers through classroom practice experiences and reflective processes. Thematic coding enabled comprehensive understanding of how these methodologies impact both students' literacy competency development and prospective teachers' instructional capability enhancement.

RESEARCH Implementation Sequence

1. Pre-Observation Phase: Preceding instructional practice commencement, baseline evaluations of hearing-impaired students' literacy competencies transpired, establishing comparative benchmarks for measuring intervention effectiveness.
2. Teaching Intervention Phase: Prospective teachers participated in structured instructional practice sessions wherein they implemented the aforementioned specialized methodologies reflective maternal approaches, perception of sound and rhythm communication techniques, and Total Communication frameworks while delivering early literacy instruction to hearing-impaired students.
3. Post-Observation Assessment Phase: Following instructional intervention completion, students' literacy competencies underwent comprehensive reassessment, and follow-up interviews with prospective teachers transpired to evaluate their reflections regarding methodology effectiveness and pedagogical competence development.
4. Data Analysis Phase: All acquired data from observations, interviews, student evaluations, and teaching artifacts underwent systematic analysis to identify patterns associated with instructional methodology implementation and measurable improvements in both teacher competence and student literacy achievement.

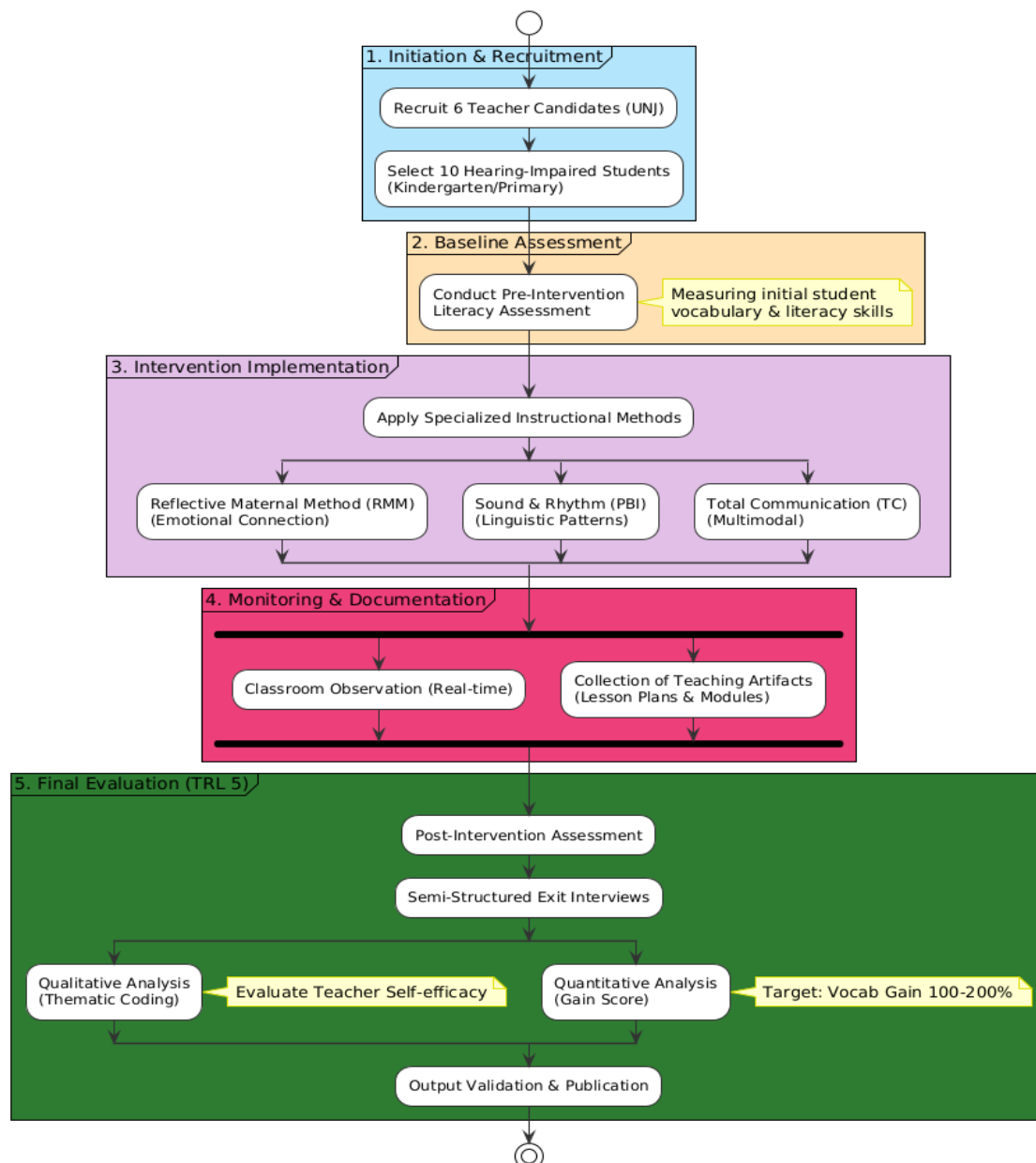
This methodological framework aims to deliver empirical insights regarding effectiveness of particular instructional methodologies for enhancing early literacy competencies among hearing-impaired students while simultaneously evaluating how these methodologies facilitate pedagogical competence increases among special education prospective teachers.

To ensure the accuracy and rigor of the findings, this study employed a structured pre-post assessment procedure to measure both students' literacy development and prospective teachers' pedagogical competence. The pre-assessment was conducted prior to the instructional intervention to establish baseline data, while the post-assessment was administered after the completion of the teaching practice period. Student literacy scores were obtained through performance-based assessments covering four key indicators: alphabet recognition, word decoding, basic reading comprehension, and vocabulary acquisition. Each indicator was scored using a standardized rubric on a scale of 0–20, with the total score representing overall literacy performance. The improvement was calculated by comparing pre- and post-assessment scores using the percentage gain formula: $(\text{post-test score} - \text{pre-test score}) / \text{pre-test score} \times 100\%$. Similarly, prospective teachers' pedagogical competence was evaluated using a structured assessment rubric that measured dimensions such as instructional confidence, application of Total Communication, implementation of reflective maternal methods, use of visual phonics, and speech development strategies, each rated on a scale of 1–10.

To ensure the validity of the assessment instruments, content validity was established through expert judgment involving three specialists in special education and literacy instruction, who evaluated the relevance, clarity, and representativeness of each indicator. The instruments were revised based on their feedback to ensure alignment with the study objectives and the characteristics of hearing-impaired learners. In addition, construct validity was supported by aligning the assessment indicators with established theoretical frameworks of early literacy and multimodal learning. Reliability was examined through inter-rater reliability procedures, in which two independent observers assessed a subset of the data, yielding a high level of agreement (above 0.85), indicating

consistency in scoring. Furthermore, triangulation across multiple data sources including observations, interviews, and teaching artifacts was employed to strengthen the credibility and trustworthiness of the findings. This systematic measurement procedure ensures that the reported improvements in both teacher competence and student literacy outcomes are valid, reliable, and empirically grounded.

Detailed Research Methodology Workflow Pedagogical Competence Development for Special Ed. Teachers



Picture 1. Research Methodology Flowchart

C. RESULT AND DISCUSSION

The empirical outcomes of this investigation demonstrate several pivotal discoveries concerning the efficacy of instructional methodologies employed by prospective special education teachers in strengthening early literacy competencies for hearing-impaired student populations. These methodologies encompass reflective maternal approaches, perception of sound and rhythm communication techniques, and Total Communication frameworks. The principal outcomes of this investigation include the following:

Enhancement of Early Literacy Competencies

The literacy capabilities of hearing-impaired students exhibited substantial advancement following the instructional intervention period. According to pre-intervention and post-intervention evaluations, students manifested enhanced alphabetic recognition, decoding proficiencies, and comprehension of elementary textual materials. The students' reading fluency similarly increased as they developed greater confidence in identifying lexical items and connecting them with semantic meanings. The Total Communication methodology, particularly, enabled students to interact with texts through multiple modalities, which facilitated their processing and comprehension of instructional materials more effectively.

Prospective Teachers' Pedagogical Capability Development

The prospective teachers demonstrated considerable advancement in their pedagogical capabilities. Pre-intervention and post-intervention interviews revealed that candidates acquired confidence in implementing the methodologies learned throughout the teacher preparation curriculum. They communicated feeling better equipped to address the distinctive requirements of hearing-impaired students, especially regarding utilization of visual phonics, rhythmic approaches, and sign language systems to deliver literacy instruction. The reflections of prospective teachers additionally emphasized the significance of employing multimodal methodologies to facilitate student learning processes.

Influence of Reflective Maternal Approaches

The implementation of reflective maternal approaches, which encompass cultivating emotional connections between educators and students, proved beneficial for vocabulary acquisition and student participation. Students exhibited greater motivation to engage in instructional sessions, and their comprehension of reading materials improved as a consequence of the emotional connections fostered throughout the teaching process. Prospective teachers observed that this methodology assisted students in feeling more supported and understood, contributing to their overall academic advancement.

Efficacy of Perception of Sound and Rhythm Communication

The perception of sound and rhythm communication methodology, which integrates auditory and rhythmic signals to facilitate language acquisition, demonstrated effectiveness in strengthening students' comprehension of linguistic patterns. This methodology assisted in bridging the gap between students' hearing limitations and their capacity to process language, which proves crucial for developing early literacy competencies. Prospective teachers communicated that the rhythmic approach enabled students to better comprehend the structure of lexical items and sentence patterns, resulting in improved reading comprehension.

Analytical Interpretation of Findings

The discoveries of this investigation emphasize the significance of incorporating multimodal and reflective methodologies into teacher preparation curricula for special education instructors. The outcomes demonstrate that Total Communication, reflective maternal approaches, and perception of sound and rhythm communication constitute highly effective methodologies for strengthening early literacy instruction for hearing-impaired students. These approaches not only address the particular challenges presented by hearing loss but also facilitate the comprehensive development of students' language and literacy competencies.

Bridging Communication Barriers

One of the fundamental challenges in delivering literacy instruction to hearing-impaired students involves bridging communication barriers between oral language and

written textual forms. The utilization of Total Communication, which integrates sign language systems, gestures, lip reading, and speech production, provides a more inclusive pedagogical approach. This methodology enables hearing-impaired students to interact with texts through multiple channels visual, tactile, and, in certain instances, auditory. The integration of these communication modalities enhances students' comprehension and word recognition, as it enables them to process language through various sensory pathways.

Participation and Motivation through Reflective Maternal Approaches

The implementation of reflective maternal approaches, which emphasize educators' emotional connections with students, constituted an effective methodology for increasing student motivation and participation. Hearing-impaired students frequently encounter challenges in emotional expression and social interaction due to their communication barriers. Through creating supportive and emotionally connected classroom environments, educators were capable of assisting students in building confidence and feeling more secure in their learning contexts. This emotional connection additionally supported students' vocabulary acquisition, as they were more inclined to engage with new lexical items when they felt emotionally involved in instructional sessions.

Strengthening Literacy Competencies through Rhythm and Sound

The perception of sound and rhythm communication methodology proved particularly effective in strengthening literacy competencies, as it assisted students in comprehending the rhythm and structure of language. Hearing-impaired students frequently struggle with phonological aspects of language, and this methodology provides them with alternative approaches to process language through visual and tactile signals. Through tapping into the natural rhythm of language, students were capable of internalizing the flow and patterns of speech, facilitating easier understanding of sentence structure and word formation. This methodology proved to be a vital instrument for improving early literacy competencies and promoting greater literacy development.

Teacher Competence in Adapting Instructional Approaches

Another pivotal discovery was the growth in pedagogical competence of prospective teachers. Through implementing methodologies like visual phonics, reflective maternal techniques, and rhythm communication, prospective teachers were capable of observing firsthand how these methodologies improved student learning outcomes. Their reflections demonstrated a deepened comprehension of the necessity for specialized instructional approaches when working with hearing-impaired students. They additionally expressed increased confidence in adapting their pedagogical approaches to address the diverse requirements of these students, thus strengthening their overall pedagogical effectiveness.

Table 1. Pedagogical Competence Enhancement

Pedagogical Competence	Pre-Assessment Score (out of 10)	Post-Assessment Score (out of 10)	Improvement (%)
Confidence in Teaching Strategies	5	8	60%
Application of Reflective Maternal Methods	5	12	140%
Use of Total Communication	5	12	140%
Incorporation of Visual Phonics	6	8	33.33%
Speech building	5	8	60%

Note: This table illustrates the progression of teacher candidates' pedagogical competence across various teaching strategy dimensions, measured through pre- and post-intervention assessment protocols. The data demonstrates significant improvements in confidence levels, strategy implementation proficiency, and adaptive teaching capabilities.

Table 2. Student Vocabulary Acquisition Progress

Student	Pre-Assessment	Post-Assessment	Improvement	Improvement in Vocabulary (%)
Student 1	5	12	7	140%
Student 2	6	13	7	116.67%
Student 3	4	12	8	200%
Student 4	7	14	7	100%
Student 5	8	16	8	100%
Student 6	5	12	7	140%
Student 7	6	13	7	116.67%
Student 8	7	15	8	114.29%
Student 9	8	17	9	112.5%
Student 10	4	11	7	175%

Note: This table categorizes vocabulary development across multiple linguistic complexity levels, including:

1. Elementary Words (Foundational): Family terms, common objects, basic environmental vocabulary
2. Repetitive Pattern Words: Reduplicated forms demonstrating phonological awareness
3. Phonetically Symmetric Words: Items with matching initial and final phonemes
4. Consonant-Vowel Combination Words: Basic syllabic structures
5. Compound Word Formations: Multi-word expressions functioning as single semantic units
6. Consonant Cluster Words: Complex phonological structures
7. Plural Transformations: Morphological variation patterns
8. Visually Associated Words: Vocabulary connected to pictorial representations
9. Affix-Based Words: Morphologically complex items with recognizable prefixes and suffixes
10. Rhythmically Patterned Words: Vocabulary demonstrating phonological parallelism]

To provide a more comprehensive interpretation of the findings, this study proposes a conceptual model that explains the relationship between instructional strategies, teacher competence development, and student literacy outcomes. The model positions multimodal instructional strategies namely Total Communication, perception of sound and rhythm, and reflective maternal approaches as primary inputs that directly influence two interconnected domains: the pedagogical competence of prospective teachers and the early literacy development of hearing-impaired students. Within this framework, the implementation of these strategies enhances teachers' instructional adaptability, confidence, and ability to apply differentiated teaching methods, which in turn mediates the effectiveness of literacy instruction delivered in the classroom.

Simultaneously, these multimodal strategies contribute directly to students' literacy outcomes by addressing cognitive, linguistic, and affective dimensions of learning. Total Communication facilitates access to language through multiple sensory channels, perception of sound and rhythm strengthens students' understanding of phonological patterns, and reflective

maternal approaches foster emotional engagement that supports vocabulary acquisition and learning motivation. The interaction between these components creates a reinforcing cycle in which improved teacher competence leads to more effective instructional delivery, which subsequently enhances student literacy performance, particularly in vocabulary development, decoding skills, and reading comprehension.

Furthermore, the model highlights the role of classroom-based practice as a critical mediating context in which these relationships occur. Through authentic teaching experiences, prospective teachers are able to internalize and refine instructional strategies, while students benefit from adaptive and responsive teaching approaches. The empirical findings of this study support this framework, as evidenced by significant improvements in both teacher competence (up to 140% in strategy application) and student vocabulary acquisition (ranging from 100% to 200%). This, the proposed conceptual model not only explains the observed outcomes but also offers a practical framework for integrating multimodal and affective instructional strategies into teacher preparation programs for special education.

This investigation's discoveries underscore the significance of integrating specialized, multimodal methodologies into teacher preparation curricula to strengthen both the pedagogical competence of prospective special education teachers and the early literacy competencies of hearing-impaired students (Wang X., 2023). The investigation clearly demonstrates that methodologies such as reflective maternal approaches, perception of sound and rhythm communication, and Total Communication prove not only effective in improving the literacy competencies of hearing-impaired students but additionally in increasing teacher confidence and competence in addressing the requirements of these learners (Peterson-Ahmad et al., 2023).

One of the primary challenges in instructing hearing-impaired students involves bridging the communication gap between oral language and written textual forms. Traditional instructional approaches frequently fail to address the sensory requirements of these students. However, the Total Communication framework, which integrates visual, tactile, and, to a limited extent, auditory communication modalities, has been demonstrated to be particularly effective. As observed by Luckins et al. (2025), this framework enables students to interact with texts in multiple approaches, strengthening their capacity to comprehend and engage with instructional materials (Powell L., & McGuigan N., 2024). It encourages a deeper connection between students and the language they are acquiring, providing them with diverse pathways to process information that would otherwise be difficult to access through hearing alone. Through incorporating gestures, sign language systems, and lip reading into instructional sessions, educators are capable of providing more inclusive environments that respect students' learning requirements and promote better participation.

The perception of sound and rhythm communication methodology, emphasized in this investigation, further facilitates the development of early literacy competencies by concentrating on phonological structures that frequently challenge hearing-impaired students. Through incorporating rhythm and visual signals, this methodology not only strengthens students' comprehension of linguistic patterns but additionally provides multisensory experiences that compensate for the absence of auditory input. Research suggests that the utilization of rhythm assists students in internalizing the flow of language, facilitating the recognition of word structures and syllables that prove crucial for reading fluency (Zanto et al., 2024).

Equally significant is the reflective maternal approach, which cultivates emotional connections between educators and students (Xiao et al., 2025). Through creating supportive environments, this framework strengthens students' participation and

encourages active involvement in learning processes. Emotional connections prove critical in the development of literacy competencies, as they facilitate cognitive and social growth (Gotlieb et al., 2022). Hearing-impaired students, particularly, benefit from this approach, as it assists them in feeling understood and valued in classroom contexts, thus improving their vocabulary development and comprehension competencies (Namestovski, Ž., & Kovari, A., 2022). This approach aligns with current research that emphasizes the significance of emotional support in special education, especially for students with communication barriers (Ko et al., 2021).

The substantial improvement in prospective teachers' pedagogical competence constitutes another noteworthy discovery. As the outcomes indicate, prospective teachers not only improved their confidence in implementing the methodologies but additionally strengthened their capacity to adapt instructional approaches to better address the requirements of hearing-impaired students. This highlights the critical role of hands-on practicum experiences in special education teacher preparation curricula, where candidates can refine their competencies in authentic educational contexts. Through actively implementing these methodologies during teaching practices, candidates acquire practical insights into the complexities of instructing hearing-impaired students, thus bridging the gap between theoretical knowledge and classroom implementation.

However, the investigation additionally indicates that teacher preparation curricula need to be more comprehensive in their inclusion of these specialized methodologies. While certain candidates demonstrated considerable growth in their instructional competence, others encountered challenges in fully implementing the methodologies. This suggests that teacher preparation curricula should place greater emphasis on multimodal, inclusive methodologies and provide more opportunities for prospective teachers to practice and refine their instructional techniques with diverse learners. Through offering more targeted instruction in areas like visual phonics, rhythm communication, and Total Communication, prospective teachers will be better equipped to facilitate hearing-impaired students in their literacy development.

In light of these discoveries, future research could explore how these methodologies can be adapted for different age groups and educational contexts, including mainstream classrooms that include hearing-impaired students. Additionally, further investigations could evaluate the long-term impacts of these methodologies on students' overall academic success and social integration, providing more comprehensive understanding of their effectiveness.

Overall, this investigation contributes to the expanding body of knowledge on best practices for instructing hearing-impaired students and highlights the significance of equipping future educators with the competencies needed to address the diverse requirements of these learners. Through integrating evidence-based methodologies into teacher preparation curricula, we can foster better learning environments, improve academic outcomes, and create more inclusive educational systems for hearing-impaired students.

C. CONCLUSION AND SUGGESTIONS

This investigation effectively addressed the critical gap in teacher preparation for delivering early literacy instruction to hearing-impaired student populations. Through implementing specialized methodologies—specifically reflective maternal approaches, perception of sound and rhythm communication, and Total Communication frameworks—the research demonstrated substantial improvements in the pedagogical

competence of prospective teachers and the early literacy skills of hearing-impaired students. The study successfully met its objectives by highlighting how multimodal instructional strategies result in significant gains in students' vocabulary acquisition and reading comprehension while simultaneously increasing educators' confidence and capacity to adapt to specific learner requirements.

Ultimately, these findings provide a solid foundation for advancing special education practices by underscoring the necessity of integrating evidence-based, multimodal methodologies into teacher preparation curricula. It is suggested that future teacher education programs place a greater emphasis on hands-on practicum experiences involving specialized techniques like visual phonics and rhythmic communication to better equip educators for inclusive environments. Furthermore, subsequent researchers are advised to conduct longitudinal assessments of these methodologies across diverse age groups and educational settings, including mainstream classrooms, to evaluate long-term academic success and social integration for learners with disabilities.

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REFERENCES

- Aldrup, K., Carstensen, B., & Klusmann, U. (2024). The role of teachers' emotion regulation in teaching effectiveness: A systematic review integrating four lines of research. *Educational Psychologist*, 59(2), 89-110
- Bryce, T. G. K., & Blown, E. J. (2024). Ausubel's meaningful learning re-visited. *Current Psychology*, 43(5), 4579-4598
- Chalise, K. (2024). Perceptions of Teachers toward Inclusive Education with a Focus on Hearing Impairment: A Quantitative Study. (*Doctoral Dissertation, Kathmandu University School of Education*)., 5(1), 70-80. <https://repository.ku.edu.np/server/api/core/bitstreams/b7766ed3-e2be-43e1-b529-81f8dc0ad5d1/content>
- Fang, Y., & Yin, G. (2025). The development of temporal cognition in hearing-impaired children and educational recommendations. *Frontiers in Psychology*, 16, 1623713.
- Fitas, R. (2025). Inclusive education with AI: Supporting special needs and tackling language barriers. *AI and Ethics*, 5(6), 5729-5757.
- Gotlieb, R. J. M., Immordino-Yang, M. H., Gonzalez, E., Rhinehart, L., Mahjouri, S., Pueschel, E., & Nadaya, G. (2022). Becoming Literate: Educational Implications of Coordinated Neuropsychological Development of Reading and Social-Emotional Functioning Among Diverse Youth. *Literacy Research: Theory, Method, and Practice*, 71(1), 80-132. <https://doi.org/10.1177/23813377221120107>
- Hidayatullah, S., Mulyati, Y., Damaianti, V. S., & Permadi, T. (2023). Effectiveness of Dialogical Reading Literacy Programs in Improving Language Skills and Literacy of Early Students. *International Journal of Learning, Teaching and Educational Research*, 22(8), 233-252. <https://doi.org/10.26803/IJLTER.22.8.13>
- Kendrick, M., Early, M., Michalovich, A., & Mangat, M. (2022). Digital storytelling with youth from refugee backgrounds: Possibilities for language and digital literacy learning. *Tesol Quarterly*, 56(3), 961-984.
- Ko, D., Mawene, D., Roberts, K., & Hong, J. J. (2021). A Systematic Review of Boundary-Crossing Partnerships in Designing Equity-Oriented Special Education Services for Culturally and Linguistically Diverse Students With Disabilities. *Remedial and Special Education*, 42(6), 412-425. <https://doi.org/10.1177/0741932520983474>
- Latifah, N., Ummah, S. S., Pattiasina, P. J., Made, I. B., Parta, W., Dwijendra, U., & Supriyanti, I. (2023).

- Literacy in Early Childhood with Hearing Loss: Challenges and Strategies in Education. *Journal of Childhood Development*, 3(2), 69. <https://doi.org/10.25217/jcd>
- Luckins, J., Tongue, G., & Clegg, J. (2025). Is the Total Communication approach effective for children with complex speech, language and communication needs? *Child Language Teaching and Therapy*, 41(1), 5–29. <https://doi.org/10.1177/02656590251315598>
- Meutia, V., & Mursita, R. A. (2018). Pedagogical Competence of Class Teachers in Learning Deaf Students. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, 9(1), 19–27. <https://doi.org/10.17509/cd.v9i1.11345>
- Mursita, R. A., Winarsih, M., Bintoro, T., Jaya, I., & Mulyeni, T. (2025). Implementation of Pancasila Student Profile in Merdeka Curriculum to Improve Deaf Students' Communication. *Journal of ICSAR*, 9(1), 81–99.
- Mursita, R. A., Winarsih, M., Bintoro, T., Maulana, B. A., Bunga, C., Khatulisty, C., Studi, P., Luar, P., Pendidikan, F. I., Jakarta, U. N., Tunarungu, K. A., Guru, S., & Interaktif, P. (2025). Teacher Strategies in Improving the Vocabulary of Deaf Students at Kindergarten Level at Pangudi Luhur Special Needs School. *JPK (Jurnal Pendidikan Khusus)*, 21(1), 32–45. <https://jurnal.uny.ac.id/index.php/jpk/article/view/78032>
- Mushtaq, R. S., Mahsud, K., Siddiqui, T. A., & Khalid, A. (2024). Exploring the Role of Early Diagnosis of Hearing Loss in Children and Its Impact on Educational Outcomes, Language Development, and Social Integration in Special Education Settings. *Review of Applied Management and Social Sciences*, 7(4), 899–913. <https://doi.org/10.47067/ramss.v7i4.421>
- Namestovski, Ž., & Kovari, A. (2022). Framework for preparation of engaging online educational materials—a cognitive approach. *Applied Sciences*, 12(3), 1745.
- O'Brien, K. M., Nagro, S. A., Binkert, G. D., Szocik, K., & Gerry, M. (2024). Field Experiences in Special Education Teacher Preparation: A Review of the Literature. *Teacher Education and Special Education*, 47(1), 5–25. <https://doi.org/10.1177/08884064231177662>
- Peterson-Ahmad, M. B., Keeley, R., & Frazier, A. (2023). Using mixed reality to support inclusive teaching strategies in general and special education preparation programs. *Social Sciences*, 12(11), 596.
- Petrocchi-Bartal, L., Khoza-Shangase, K., & Kanji, A. (2025). Early Intervention for Hearing-Impaired Children—From Policy to Practice: An Integrative Review. *Audiology Research*, 15(1), 1–21. <https://doi.org/10.3390/audiolres15010010>
- Powell, L., & McGuigan, N. (2024). Looking within: cultivating compassion for shaping sustainable mindsets in accounting education. *Meditari Accountancy Research*, 32(5), 1787–1808.
- Sajewicz-Radtke, U., Łada-Maśko, A. B., Jurek, P., Olech, M., & Radtke, B. M. (2025). Reading and Writing Abilities in Students with Mild Nonspecific Intellectual Disability: A Multivariate Examination of Literacy and Cognitive Processing Abilities. *Journal of Intelligence*, 13(12), 161.
- Wang, X. (2023). Exploring positive teacher-student relationships: The synergy of teacher mindfulness and emotional intelligence. *Frontiers in psychology*, 14, 1301786.
- Xia, Y., Shin, S. Y., & Kim, J. C. (2024). Cross-cultural intelligent language learning system (CILS): Leveraging AI to facilitate language learning strategies in cross-cultural communication. *Applied Sciences*, 14(13), 5651.
- Xiao, F., Zou, E. W., Lin, J., Li, Z., & Yang, D. (2025). Parent-led vs. AI-guided dialogic reading: Evidence from a randomized controlled trial in children's e-book context. *British Journal of Educational Technology*, 56(5), 1784–1813.
- Zanto, T. P., Giannakopoulou, A., Gallen, C. L., Ostrand, A. E., Younger, J. W., Anguera-Singla, R., Anguera, J. A., & Gazzaley, A. (2024). Digital rhythm training improves reading fluency in children. *Developmental Science*, 27(3), 1–15. <https://doi.org/10.1111/desc.13473>