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THE ROLE OF THE PHONICS METHOD IN STIMULATING READING AND LANGUAGE SKILLS IN CHILDREN AGED 3–6 YEARS WITH SPEECH DELAY

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Abstract

Phonics is a method of teaching reading and speech that emphasizes the systematic relationship between letters and sounds (phonemes). This study systematically reviews effective phonics strategies for children aged 3–6 years with speech delays, while also identifying success factors and formulating practical recommendations. The novelty of this study lies in its exclusive focus on early childhood with speech delays and its multidimensional perspective, which integrates technology, clinical profiling, and the mapping of seven key success factors. The primary contribution is the development of evidence-based, practice-oriented recommendations for both speech therapy professionals and family caregivers, thereby extending the applicability of phonics interventions beyond previous reviews. The research employed a Systematic Literature Review (SLR) guided by PRISMA, ensuring methodological rigor. From 660 publications identified through Google Scholar (2020–2025), 21 studies were retained using eight quality criteria and analyzed narratively. Although Google Scholar served as the main database, it indexes reputable journals listed in Scopus, PubMed, and Web of Science, thus ensuring diversity and reliability. Findings indicate that phonics interventions are effective for children with Autism Spectrum Disorder (ASD), Developmental Language Disorder (DLD), hearing impairments, and bilingual contexts. Success depends on early and accurate diagnosis, intensive and structured sessions, adaptive digital technology, and sustained professional support. However, further field trials in Indonesia are recommended to evaluate contextual applicability, especially concerning standardized diagnostic tools, personalized interventions, digital learning integration, and active parental involvement in therapy.

Keywords: Early childhood; Phonics; Phonological awareness; Speech delay; Speech therapy.

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INTRODUCTION

Early childhood, particularly ages 3–6, constitutes a critical period for the development of language, cognition, and foundational literacy. At this stage, children begin to mature in articulation, sound recognition, and symbol comprehension—skills that underpin effective reading and communication (1,2). Not all children, however, achieve optimal language milestones. One common challenge is speech delay, a condition in which children fail to reach age-appropriate speech milestones (3). Kim et al. report that roughly 2–11 percent of preschoolers experience developmental language disorders, with speech delay among the most prevalent (4). Speech delay can have far-reaching effects on overall health, including mental and social well-being (5). Children with speech disorders often struggle to express their needs, establish social interactions, and may display frustration that leads to aggressive behavior or social withdrawal. In the long term, speech delay can undermine academic performance, self-confidence, and heighten the risk of learning disorders (6). Consequently, interventions must be both therapeutic and educational, simultaneously stimulating receptive and expressive language.

One increasingly adopted early-intervention approach is phonics. Phonics is a method of teaching reading and speech that emphasizes systematic relationships between letters and sounds (phonemes). Through this method, children are taught to recognize, discriminate, and blend phonemes to form words, thereby improving articulation accuracy and phonological perception. Several studies indicate that phonics effectively enhances phonological awareness, speech intelligibility, and early decoding skills, especially in young children with speech difficulties (7,8).

This study shares certain similarities with previous research. Lestari highlights the importance of stimulation for children with speech delay including phonics which aligns with this study's focus on stimulating language and reading in early childhood (9). Khotimah et al. demonstrate the effectiveness of a phonics approach in improving reading skills among 4- to 5-year-olds, consistent with the main thrust of the present study (10). Budiati et al. stress the importance of early detection and consistent stimulation during

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children's developmental "golden period," a principle reflected in this study's aim to identify the most effective phonics strategies from an early age (11). All three emphasize the role of an appropriate environment and stimulation in supporting early language development.

Despite these similarities, important differences remain. Lestari is a general literature review of various stimulation methods and does not focus deeply on the effectiveness of phonics, whereas the current study analyzes phonics strategies in detail (9). Khotimah et al. assess phonics only in typically developing school settings, without examining children with speech delay or exploring success factors and implementation recommendations in therapy and at home (10). Budiati et al. focus on early multilingual stimulation, not specifically on phonics or reading in children with speech delay (11). Moreover, the present research uses a systematic approach across multiple studies and formulates practical recommendations for caregiving and therapy services—topics the three earlier studies do not explore in depth.

The main objective of this research is to analyze the most effective phonics strategies for stimulating reading and language skills in 3- to 6-year-olds with speech delay, to identify the factors that drive successful intervention, and to develop practical recommendations for implementing phonics in therapy services and family care. Its novelty lies in its specific focus on phonics efficacy for children with speech delay, comprehensively examined through evidence-based analysis of success factors and the formulation of practical recommendations applicable in therapeutic and caregiving contexts. Unlike earlier studies that addressed stimulation methods superficially or examined children without speech disorders, this research integrates health, educational, and evidence-based intervention perspectives within the context of language-delayed children, thus providing new insights into phonics-based speech therapy during early childhood.

The study's contribution to health science is the strengthening of multidisciplinary interventions that integrate educational and therapeutic dimensions for managing speech delay. By exploring and formulating evidence-based phonics strategies, this research can enhance speech therapy effectiveness,

accelerate early detection of language disorders, and enrich intervention protocols in child-development services. Its findings can inform clinical practice guidelines for speech-language therapists, pediatricians, and developmental psychologists, while supporting preventive-promotive policies at community health centers and hospitals. More broadly, incorporating phonics as part of neurocognitive-based intervention may improve children's quality of life, strengthen communication skills, and prevent long-term psychosocial complications arising from untreated speech delay.

RESEARCH METHODS

The approach used in this study was a qualitative approach with the Systematic Literature Review (SLR) method. SLR was a research technique aimed at systematically identifying, reviewing, evaluating, and interpreting all relevant research findings related to the topic under discussion. This method was designed to synthesize evidence from various previous studies in order to comprehensively answer the research questions. The study employed a descriptive narrative design. The systematic review was structured based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which provided a reporting framework consisting of identification, screening, and inclusion phases.

The main objective of this study was to identify the most effective phonics strategies in stimulating reading and language skills in children aged 3–6 years with speech delay, to outline the success factors of the interventions, and to develop practical recommendations for the application of phonics methods in various settings, including formal education, therapy services, and family caregiving.

Search Strategy and Boolean String

The literature search was conducted comprehensively through various academic databases such as Google Scholar. Although the literature search in this study was limited to Google Scholar, the database indexes a wide range of articles from reputable international journals, including those listed in Scopus, PubMed, and Web of Science. Therefore, the diversity and quality of the literature sources remain well-maintained. Boolean strings were designed to enhance the relevance of search results related to

phonics interventions for children with speech delays.

Table 1. Boolean Search String

Boolean String	Number of Manuscripts
("phonics" OR "synthetic phonics" OR "analytic phonics" OR "phonological awareness") AND ("language delay" OR "speech delay" OR "delayed speech") AND ("reading development" OR "language acquisition" OR "literacy skills") AND ("preschool" OR "early childhood" OR "children aged 3-6")	660

Source: Author, 2025

PICOC Framework

The formulation of the research question and search strategy was based on the PICOC framework to ensure alignment between the scope of the study, data search strategy, and analytical focus.

Table 2. PICOC Structure

Element	Description
Population	Children aged 3–6 years with speech delay
Intervention	Phonics-based learning strategies and language interventions
Comparison	Traditional methods, non-phonics strategies, or no intervention
Outcome	Reading ability, language development, speech clarity, improvement in receptive and expressive language
Context	Preschool educational settings, therapy services, and family caregiving environments

Source : Author, 2025

Tabel 3. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Type of Literature	Journal articles	Books, undergraduate theses, master's theses, dissertations, seminar papers, reports, proceedings, non-peer-reviewed publications, and Systematic Literature Reviews (SLRs)
Language	English	Languages other than English
Field of Study	Early childhood education, speech therapy, special education, developmental psychology, language acquisition, literacy	Irrelevant fields such as engineering, economics, politics, law, and unrelated health sciences
Time Range	Years 2020–2025	Before 2020 or outside 2020–2025
Geographical Scope	International studies involving children aged 3–6 years with speech or language delays	Studies that do not discuss phonics or are unrelated to early childhood language and literacy development

Source : Author, 2025

Selection Process and Quality Assessment

Each article was evaluated using a binary scoring system (0 = No; 1 = Yes) based on eight quality criteria :

Tabel 4. Quality Assessment Questions

Code	Article Quality Criteria
Q1	Is the research objective clearly stated?
Q2	Is the article relevant to the discussed population and intervention?
Q3	Is the methodology transparently described?
Q4	Are the intervention outcomes presented in detail?

Q5	Does the article include empirical data (quantitative/qualitative)?
Q6	Does the article conclude its findings and provide recommendations?
Q7	Is the full text of the article accessible?
Q8	Is the article indexed in a reputable journal?

Source : Author, 2025

Eligibility Process

At this stage, the selected articles specifically focused on the use of phonics methods to stimulate reading and language skills in children aged 3–6 years with speech delays. These articles were thoroughly analyzed, from the abstract to the full text.

The screening process resulted in 21 relevant articles that met the quality criteria. The PRISMA flow diagram below illustrates the entire article selection process used in this Systematic Literature Review (SLR) analysis.

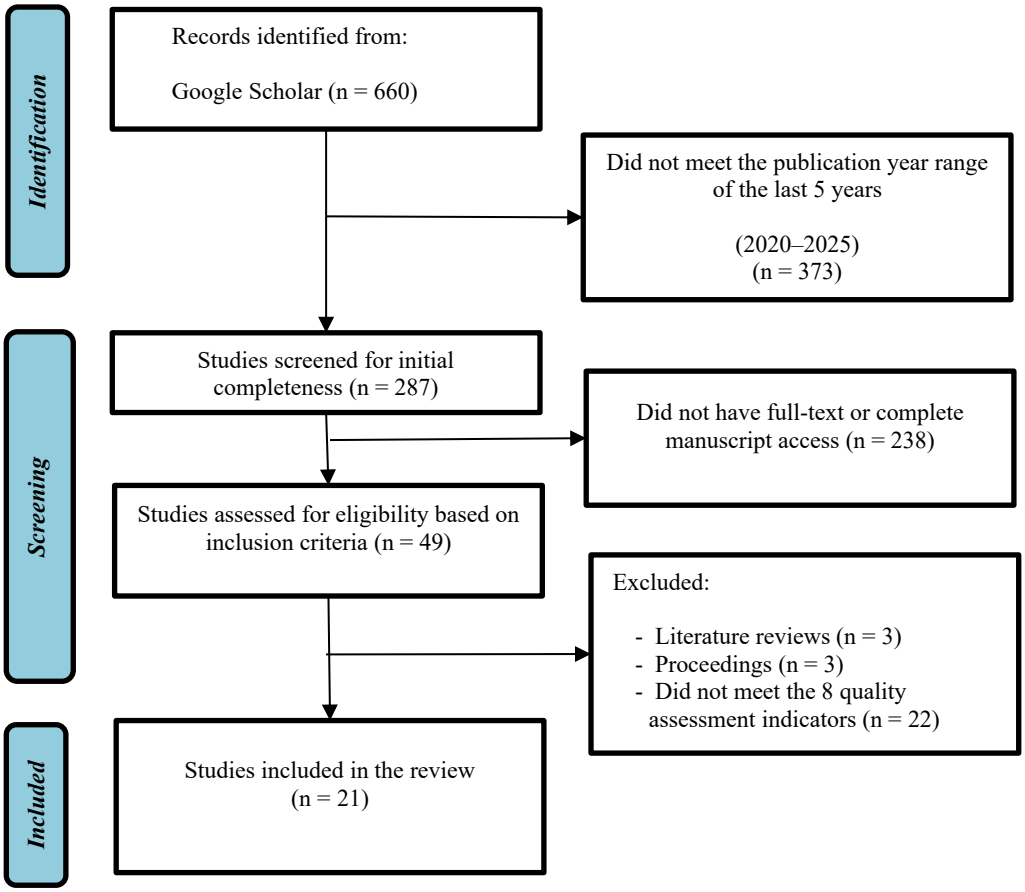

Figure 1. PRISMA Flow Diagram

RESULTS AND DISCUSSION

Results

Distribution of Articles Used

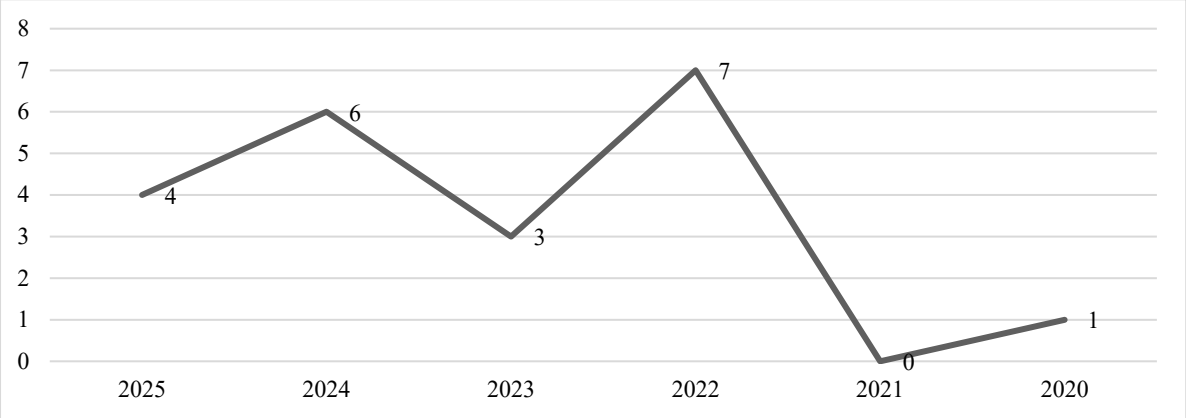

Figure 2. Distribution of Artcles by Year

The distribution of articles used in this study shows variation from year to year. In 2020, there was 1 article. In 2022, there were 7 articles, followed by 3 articles in 2023, 6 articles in 2024, and 4 articles in 2025. In total, 21 articles were reviewed, with an overall trend of increasing publication numbers over the past three years (Figure 2).

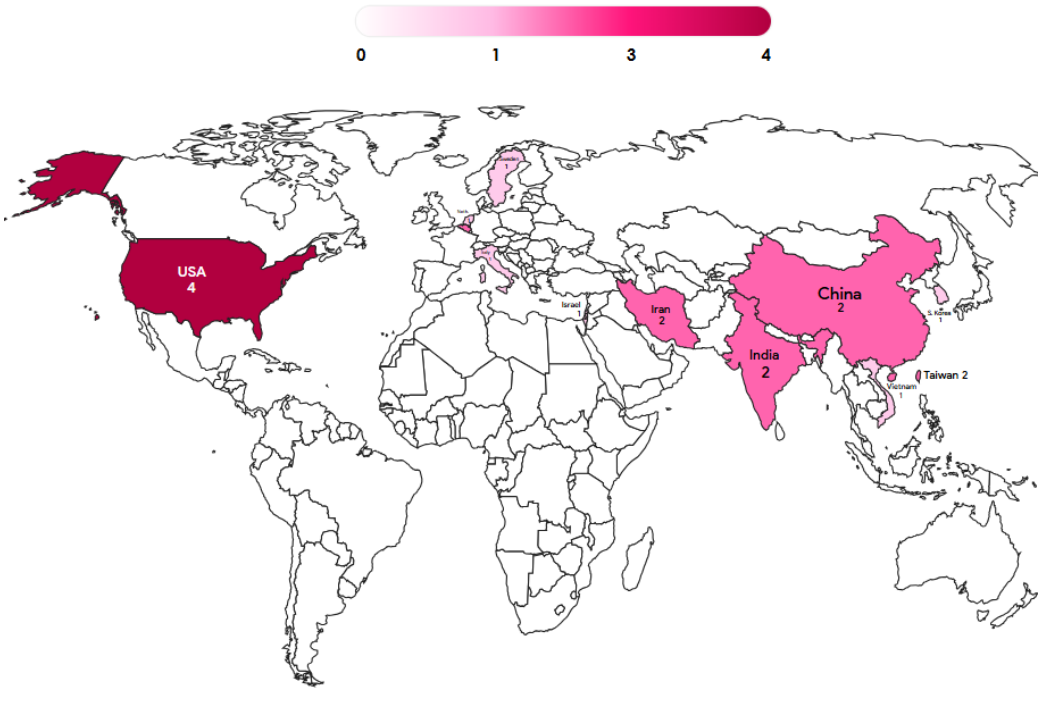

Figure 3. Distribution of Articles by Country

The distribution of articles by country shows that the United States dominates with the highest number of articles, totaling 4. Following this, India, Iran, Taiwan, China, and Belgium each contributed 2 articles. Meanwhile, other countries such as Palestine, South Korea, Vietnam, the Netherlands, Sweden, Italy, and Israel each contributed 1 article. In total, 21 articles were analyzed in this distribution, reflecting the diversity of countries involved in the related research. The visualization on the map supports this data through color intensity based on the number of articles (Figure 3).

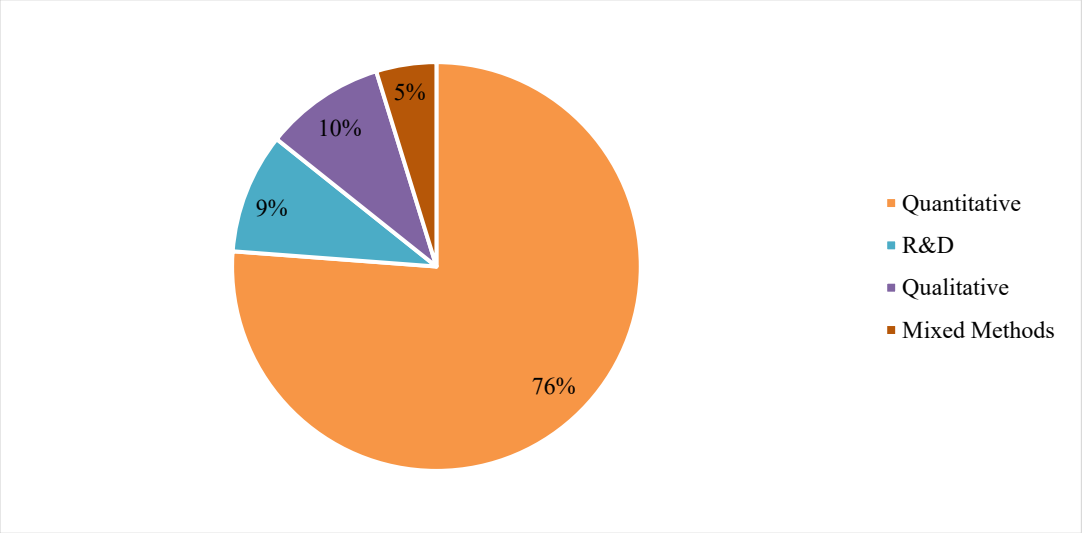

Figure 4. Distribution of Articles Based on the Methods Used

The distribution of articles based on research methods shows that the majority of studies employed a quantitative approach, with 16 articles or approximately 76% of the total. Qualitative methods were used in 2 articles (around 10%). Meanwhile, the mixed methods approach (a combination of quantitative and qualitative) was applied in 1 article (about 5%), and the Research and Development (R&D) method was found in 2 articles (approximately 9%). These findings indicate that while the quantitative approach remains the most dominant, qualitative, mixed methods, and R&D also contribute to enriching the variety of approaches in the analyzed studies.

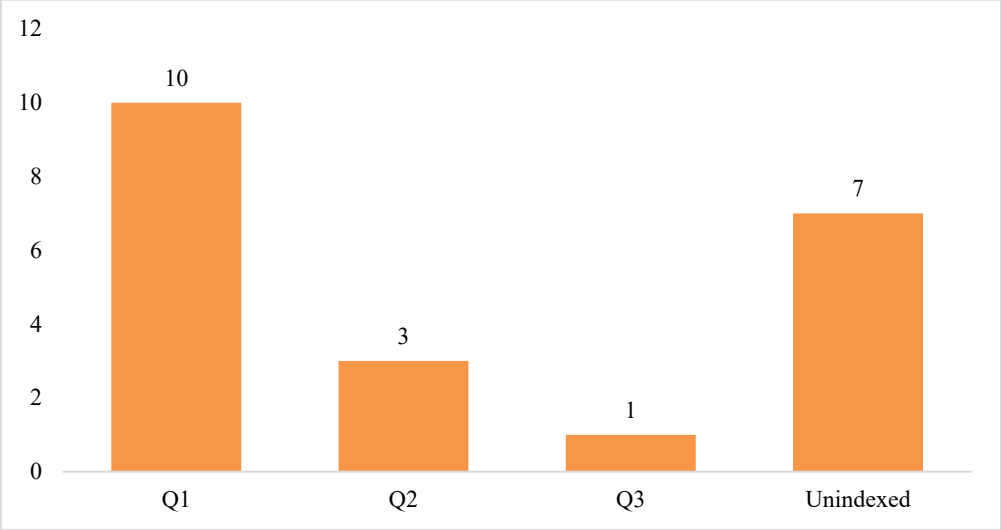

Figure 5. Distribution of Articles by Quartile

Based on Figure 5, the distribution of the reviewed articles by quartile shows that the majority come from Q1 journals, totaling 10 articles. This number is significantly higher compared to the other quartiles. Only 3 articles were published in Q2 journals, while Q3 contributed just 1 article. In addition, 7 articles were published in journals that are not quartile-indexed (unindexed). These findings indicate that most of the articles used originate from high-reputation journals (Q1), although there is still diversity in the quality and sources of publication.

Role of the Phonics Method in Stimulating Reading and Language Skills

Table 5 outlines seven key roles that the phonics method plays in enhancing early-childhood reading and language abilities, especially for children with speech delays or developmental disorders. First, phonics has been shown to improve phonological awareness and sound perception—skills that are crucial for preventing dyslexia and language disorders. In addition, structured phonics exercises increase articulation accuracy and speech intelligibility. For children with hearing impairments and autism, phonics interventions also foster growth in semantic, syntactic, and narrative skills.

In the technological domain, phonics-based digital media such as serious games serve as child-friendly therapeutic tools that practitioners find effective. Beyond intervention, phonics encourages the development of diagnostic tools—such as ESP assessments and deep-

learning models—for the early detection of phonological disorders. Socially, the approach helps narrow early-literacy gaps, particularly among children at risk of dyslexia or developmental language disorder (DLD). Finally, for bilingual children and those in multilingual environments, phonics plays a vital role in phonological adaptation and the development of context-rich narratives.

Table 1. The Role of the Phonics Method in Stimulating Reading and Language Skills

No.	Role	Core Health & Language Impact	Source Articles
1	Enhancing phonological awareness & sound perception	Significantly improves phoneme discrimination, phonological awareness, and auditory processing skills; plays a role in preventing dyslexia and language disorders.	(12–15)
2	Improving articulation accuracy & speech intelligibility	Children show marked improvements in final consonant production, vowel coarticulation, and speech intelligibility after phonological therapy or intervention.	(16–18)
3	Stimulating language development in children with hearing impairment/autism	Phonological and phonetic intervention programs effectively enhance semantic, syntactic, and narrative skills in children with hearing loss and ASD.	(7,8,15)
4	Optimizing speech therapy through phonics-based digital media	Phonetic serious games such as *Ava* serve as effective therapy aids, rated highly usable by both SLPs and children; 100% of children enjoyed the visual design.	(19)
5	Developing diagnostic tests for detecting phonological disorders	Speech consistency tests, ESP tests, and deep learning models (accuracy >70%) are used for early screening of speech production disorders and phonological awareness.	(12,20,21)
6	Reducing early literacy gaps in children at risk of dyslexia or DLD	At-risk children show improvements in decoding and rise time discrimination with auditory and phonics intervention; preschool phonology is a key predictor.	(13,14,22)
7	Stimulating language development in bilingual or language-impaired children	Community language exposure and bilingual structures influence voice onset time, phonological skills, and narrative ability, supporting the need for contextual diagnosis.	(23–25)

Success Factors of Phonics Interventions

Table 6 outlines seven key factors that contribute to the success of phonics interventions in stimulating reading and language abilities in children aged 3–6 years with speech delays. Success begins with early diagnosis using valid and reliable assessment tools such as the ESP test (ICC 0.74–0.94), followed by intensive interventions with well-defined designs and targets, which have been proven to significantly improve language scores.

The integration of technology and multimodal approaches, such as therapeutic games and AI models, enhances both engagement and therapeutic outcomes. Environmental factors,

including bilingualism and community language exposure, influence children's phonological patterns, while internal linguistic capacity such as vocabulary and utterance structure affects learning processes. Moreover, biomedical conditions such as tongue-tie or specific developmental disorders require long-term intervention. Lastly, the role of educators who understand phonological literacy and can bridge theory with practice is crucial to the success of phonological learning in real-world settings.

Table 2. Success Factors of Phonics Interventions in Stimulating Reading and Language Skills in Children Aged 3–6 Years with Speech Delay

No.	Success Factor	Implementation Strategy	Description (Quantitative & Qualitative)	Sources
1	Early Diagnosis and Accurate Evaluation Instruments	Use of valid and reliable tools such as the ESP test, speech consistency test, and acoustic analysis.	Test–retest ICC of ESP test ranges from 0.74 to 0.94; high validity found in the Persian Speech Consistency Test (ICC = 0.88–0.89). Children aged 5–6 scored significantly higher than those aged 3–4 ($p < 0.05$). Early diagnosis improves therapy effectiveness.	(12,17,20,26)
2	Intensity, Design, and Clear Intervention Targets	Implement interventions with sufficient sessions, specific phoneme focus, and direct phonetic approaches.	A 44-session intervention (Awad) increased language scores from 2.40 to 50.00 (a 48.2-point gain; $p \leq 0.05$); an 18-session therapy (Potapova) improved final cluster accuracy from 0% to ≥90%. Focused and intensive therapy is highly effective for children with speech delays.	(7,16,18,22)
3	Integration of Technology and Multimodal Approaches	Use of therapy games, voice-based AI, and digital tools in phonological learning.	The game "Ava" received a usability score of 6.25/7 by SLPs; 100% of children liked its visuals. A CNN model classified children's voice disorders with 74.4% accuracy. GraphoGame significantly improved rise time discrimination ($p < 0.05$). Technology boosts engagement and therapy outcomes.	(13,14,19,21)
4	Influence of Language Environment and Bilingualism	Analyze the effects of community exposure and bilingualism on children's phonological patterns.	Bilingual children showed more prevoicing and shorter VOT compared to monolinguals ($p < 0.05$). Community exposure predicted prevoicing ($\beta = -0.32$; $p < 0.01$). Bilingualism shapes unique phonological patterns and affects therapy outcomes.	(23,24,27)
5	Child's Linguistic Structure and Language Capacity	Analyze utterance length, word class types, narrative structure, and vocabulary.	Regression model of POS against MLU showed $R^2 = 0.332$ ($p < 0.001$). Children with high vocabulary had better word-learning ability ($d = 1.01$). ASD children's narratives were weaker in macrostructure but similar in	(15,28)

No.	Success Factor	Implementation Strategy	Description (Quantitative & Qualitative)	Sources
			microstructure.	
6	Biomedical Conditions and Specific Needs of Special Children	Identify conditions such as tongue-tie, ASD, DLD, UCLP, and design tailored interventions.	Prevalence of tongue-tie in Persian children was 14.9%, affecting sounds /s/, /l/, /t/ ($p < 0.05$). Children with DLD had low decoding scores ($\beta = 0.42$; $p < 0.01$). UCLP children had only 79.7% PCC at ages 7–8. These conditions require long-term management.	(8,18,22,26)
7	Educator Support and Learning Environment	Involve teachers in phonological literacy training and bridge theory with classroom practice.	Teachers favor meaning-based (whole-language) approaches, but actual practice remains letter- and vocabulary-based due to curriculum pressures. This gap affects teaching effectiveness. Children with developmental delays showed DQ improvements from 80.43 to 97.14 ($p < 0.001$).	(25,29)

Practical Implementation Recommendations for the Phonics Method in Therapy and Family Care Services

Practical Implementation in Speech Therapy Services

a. **Use early diagnosis and standardized assessment tools:** Studies by Desai & Deshpande and Zarifian et al. show that phonological assessment tools such as the Early Speech Perception (ESP) test and Speech Consistency Test, which have high reliability (ICC = 0.74–0.94), can help identify issues early. This is crucial for setting precise intervention targets (12,20).

b. **Design structured, intensive, and targeted interventions:** Intervention programs such as Awad's demonstrated significant results through an intensive session-based approach (44 sessions)(7). Consistent, gradual therapy focused on specific phonemes—like in Potapova et al, which achieved ≥90% articulation accuracy after 18 sessions—has also proven highly effective (16).

c. **Integrate digital media and play-based approaches:** Saeedi et al. developed the serious game "Ava," rated as highly user-friendly by therapists and children, with 90% of children enjoying it. Interactive media helps maintain children's attention and accelerates mastery of consonants, syllables, and sentences through multimodal repetition (19).

d. **Adapt approaches to individual child profiles (Bilingual, ASD, SSD, UCLP):** Studies by Mayr et al. and Oren & Sukenik suggest that bilingual children and those with speech sound disorders (SSD) or ASD require personalized approaches (8,23). For example, children with ASD may show weaknesses in syntax and semantics but have phonological performance comparable to typically developing peers.

e. **Conduct longitudinal monitoring and long-term therapy adjustments:** A longitudinal study by Larsson et al. emphasizes that children with specific conditions such as cleft palate (UCLP) may continue to need therapy support into school age, as phonetic difficulties can persist despite gradual improvements (18).

f. **Utilize technologies like deep learning and acoustic analysis:** Kuo et al. demonstrate that machine learning can support automatic identification of children's speech disorders (21). Digitally supported therapy enables individualized needs mapping and ongoing evaluation using the child's actual voice data.

Practical Implementation in Family Care Environments

a. **Actively involve parents in phonological learning at home**: Studies by Le et al. and Hearnshaw et al. emphasize the crucial role of parents in improving children's intelligibility through daily involvement. Consistent practice using words taught during therapy can accelerate the generalization of speech skills (27,30).

b. **Use storytelling, picture books, and phoneme exercises in daily routines**: He et al. and Sun & Ho recommend engaging in storytelling, object naming, and phoneme blending during family activities. Children with ASD and language delays have shown improvements in narrative structure and phonological awareness after training using story-based approaches (15,29).

c. **Provide a rich and pressure-free auditory environment**: Phonics practice doesn't always need to be academic. Studies by Herck et al. and Bempt et al. suggest listening to stories with emphasized intonation patterns (rise time) to naturally

enhance sound perception. The home can be an ideal setting for this kind of auditory habituation (13,14).

d. **Use everyday language supported with visual and kinesthetic cues**: Research by Varghese and Colombo et al. shows that young children often lack stable articulatory control. Therefore, the use of visual aids, hand gestures, or physical syllable games is highly recommended in home interactions (17,22).
e. **Understand the child's limitations and specific needs**: Parents of children with DLD (Developmental Language Disorder) or SSD should understand that progress may be gradual. Home-based interventions that are supportive and non-pressuring help promote both emotional development and speech abilities (16,25).

Discussion

The most effective phonics strategy for stimulating reading and language skills in children aged 3–6 years with speech delays begins with early diagnosis using standardised instruments (e.g., the ESP Test, Speech Consistency Test). This is followed by a structured, intensive programme that targets specific phonemes, employs multimodal game- or AI-based approaches, and is tailored to each child's profile—including bilingual children, those with ASD or DLD, and those with biomedical conditions such as tongue-tie or UCLP—while being monitored longitudinally. Intervention success rests on seven key factors: (1) accurate initial evaluation; (2) clear session intensity and design; (3) integration of technology and interactive media; (4) the influence of language environment and bilingualism; (5) the child's internal linguistic capacity (vocabulary, narrative skills); (6) biomedical conditions and special needs; and (7) educators who effectively bridge theory and practice.

In speech-therapy settings, implementation involves reliable diagnostics, intensive schedules (≥18–44 sessions) with focused phoneme content, serious games or AI to boost engagement, personalised approaches for special needs, and machine-learning-based voice analytics for continuous assessment. In the home, success is reinforced through active parental involvement in daily phoneme practice, storytelling and rhyming activities that emphasise rise time, a rich

yet pressure-free auditory environment, visual–kinesthetic supports (hand gestures, picture cards), and a supportive attitude that recognises the child's gradual progress.

These findings stand out by combining standardised early diagnosis, structured-intensive phonics intervention, and AI-based interactive technology, forming a comprehensive, personalised framework for diverse conditions (bilingualism, ASD, DLD, tongue-tie, UCLP). The approach strengthens Lestari's emphasis on varied stimulation and parental engagement (9), supports Khotimah et al. on phonics-driven early reading gains (10), and validates Budiati et al. on the importance of early detection (11). It advances prior work by introducing machine-learning voice analytics and longitudinal monitoring, offering deeper practical and theoretical contributions to both speech therapy and home-based care.

The implications of these findings in the health sector are highly significant, particularly in strengthening a multidisciplinary approach for the early detection and intervention of speech delays in children aged 3–6 years. Phonics strategies based on early diagnosis, structured intervention, and AI-based technology not only improve children's language and literacy outcomes but also play a crucial role in preventing long-term impacts on their mental, social, and cognitive health (31). The use of standardized diagnostic tools such as the ESP test and speech consistency test enables healthcare professionals, especially speech therapists and pediatricians, to accurately identify issues at an early age, allowing interventions to be implemented before children face more complex communication barriers (32,33). The integration of digital media and machine-learning evaluations also opens opportunities for the development of adaptive and efficient telehealth-based speech therapy services, particularly in areas with limited access (34). The recommendations in this study are also aligned with the National Guidelines for Child Growth and Development Services and the Regulation of the Minister of Education and Culture of the Republic of Indonesia on the Standards for Early Childhood Development Achievement Levels (35), which emphasize the importance of early detection, structured stimulation, and family involvement in

supporting children's language, cognitive, and socio-emotional development. In addition, the phonics approach used in this study is consistent with practices endorsed by the Indonesian Association of Speech Therapists (IkatWI), which advocates the use of standardized assessments and evidence-based interventions in speech therapy services. With active parental involvement and coordinated professional support, this strategy also enhances the overall quality of child development services and paves the way for more personalized, preventive, and sustainable therapy models within pediatric healthcare systems.

This article offers implementation strategies for caregivers and family educators. Although these strategies are largely extrapolated from the findings of the 21 reviewed articles, the approach adopted in this study remains grounded in strong empirical evidence and a systematic feasibility assessment process. Each included article underwent evaluation based on eight quality criteria and a narrative analysis using the PICOC framework, ensuring contextual relevance in terms of population, intervention, and outcomes. Consequently, the formulated recommendations are not merely theoretical but also take into account the contextual feasibility of implementation, particularly in therapeutic and caregiving settings. However, direct field testing in Indonesia is still recommended to assess the validity of these strategies in real-world practice, including in terms of available resources, family literacy culture, and parental engagement at the local level. This approach presents an opportunity for further research to examine the effectiveness of the phonics interventions systematically formulated in this study.

CONCLUSION AND RECOMMENDATION

A systematic review of 21 studies published between 2020 and 2025 indicates that the most effective phonics interventions for children aged 3–6 years with speech delays comprise early diagnosis using standardized instruments (e.g., the ESP Test and Speech Consistency Test), structured and intensive therapy targeting specific phonemes, and the integration of AI-based technologies with multimodal approaches such as serious games and automated voice analysis. The effectiveness of these interventions is determined by seven

interrelated factors: the precision of early diagnosis, the intensity and clarity of therapeutic design, the utilization of technology and interactive media, the influence of linguistic environment and bilingual exposure, children's intrinsic linguistic capacity, biomedical and developmental conditions, and the role of educators and learning contexts. While practical recommendations emphasize individualized strategies, active parental involvement, and the incorporation of educational technologies, implementation in Indonesia remains constrained by disparities in infrastructure, professional expertise, linguistic diversity, caregiver literacy, and access to digital resources. Accordingly, future research should not only examine the empirical effectiveness of phonics interventions through experimental field studies but also evaluate the preparedness of human resources, institutional infrastructure, and technological literacy, while further investigating cultural, social, and economic barriers to ensure that internationally validated phonics strategies can be contextually adapted and sustainably integrated into Indonesia's early childhood education and therapy systems.

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