

Designing a phonological awareness-based early literacy intervention for preschool and early elementary children: An ADDIE analysis and design study

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Received: May 10, 2026

Revised: August 20, 2026

Accepted: August 21, 2026

KEYWORDS

ADDIE Model
Early Literacy
Needs Analysis
Phonological
Awareness

ABSTRACT

Early literacy skills constitute a fundamental foundation for children's reading and writing development. However, literacy instruction in preschools and early elementary classrooms continues to emphasize letter recognition, while the systematic development of phonological awareness receives limited attention. This study aimed to analyze instructional needs and to design a conceptual prototype of an early literacy intervention model based on a phonological awareness approach. A Research and Development approach using the ADDIE model was adopted; this article reports the Analysis and Design phases only, while the Development, Implementation, and Evaluation phases are planned for subsequent research. The needs analysis combined classroom observations, play-based assessments of children's phonological awareness, semi-structured teacher interviews, and document analysis, involving one kindergarten, one elementary school, 60 children, and 12 teachers in Tasikmalaya City, Indonesia. Most children had difficulty identifying initial sounds, segmenting words of three or more syllables, recognizing rhymes, and manipulating simple phonemes, with the greatest difficulty on voicing contrasts. Teachers equated reading readiness with alphabet recognition and had no instructional resources for phonological awareness. The resulting conceptual prototype rests on five design principles—progressive phonological development, play-based learning, contextualized instruction, practical applicability, and embedded assessment—and specifies learning objectives, instructional syntax, an activity hierarchy, media, and assessment strategies. Because expert validation, practicality testing, and effectiveness testing have not been conducted, the model is presented as a design hypothesis, not as a validated intervention.

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Introduction

Early literacy skills provide a critical foundation for children's subsequent academic development (Panel, 2008; Snow et al., 1998). One of the core components of early literacy is phonological awareness, defined as the ability to recognize, discriminate, and manipulate the sound structures of spoken language, including syllables, rhymes, and phonemes (Adams, 1990). This ability is widely recognized as a prerequisite for beginning reading because it enables children to understand the relationship between speech sounds and written symbols. Previous studies have consistently demonstrated that phonological

awareness is strongly associated with children's reading, writing, and overall language development (Goswami & Bryant, 2016; Stanovich, 2000). Children with well-developed phonological awareness tend to acquire reading skills more readily and achieve higher levels of academic performance than those with limited phonological awareness (Lonigan & Shanahan, 2009; Whitehurst & Lonigan, 1998). Therefore, fostering phonological awareness during early childhood is essential for establishing a strong foundation for literacy development.

Recent Indonesian research further shows that early literacy development requires intentional and systematically organised learning experiences rather than isolated exposure to reading and writing activities. Wiyani & Nuryana (2023) describe early literacy as an educational need that requires structured program management and coordinated learning support during early childhood.

Despite its recognized importance, numerous studies conducted in Indonesia have reported that young children's phonological awareness remains relatively underdeveloped (Susanto, 2021; Wahyuni, 2022). Literacy instruction in early childhood education settings primarily emphasizes letter recognition and beginning reading, whereas systematic stimulation of children's ability to perceive, discriminate, and manipulate speech sounds is still limited (Fitriani, 2020; Mulyani, 2021). This situation is further compounded by evidence indicating that many early childhood teachers have insufficient understanding of the role of phonological awareness and lack appropriate instructional strategies to promote its development (Handayani, 2021; Prasetyo, 2023). Recent Indonesian evidence also indicates that expectations regarding children's literacy at school entry remain strongly shaped by teachers' assumptions about reading and writing readiness. Sulistiyawati et al. (2024) found that most participating elementary teachers expected children entering school to be able to read words and write simple sentences. Such expectations may contribute to instructional practices that prioritise visible reading performance and alphabetic skills, making explicit attention to underlying phonological processes particularly important. Consequently, children receive limited opportunities to develop the foundational skills necessary for successful literacy acquisition. Weak phonological skills are among the earliest and most reliable markers of later reading difficulty, which is why early identification and early, explicit instruction are recommended rather than a wait-to-fail approach (Hulme & Snowling, 2013; Vellutino et al., 2006).

Internationally, several phonological awareness-based intervention programs, including Phonological Awareness Training, Jolly Phonics, and Sounds-Write, have demonstrated effectiveness in improving children's early reading and writing skills (Putri & Hayati, 2022; Ukrainetz, 2009). In Indonesia, research on phonological awareness has grown in recent years; however, it has predominantly focused on assessing children's phonological skills and providing professional development for teachers. Previous studies have shown that psychoeducational interventions can enhance early childhood teachers' understanding and implementation of phonological instructional strategies in classroom practice (Pratiwi et al., 2025). Moreover, assessments conducted in several early childhood education centers in Tasikmalaya City revealed that many children had not yet achieved optimal phonological development, largely because systematic and differentiated instructional approaches had not been implemented (Pratiwi et al., 2018). Other studies likewise reported that children continue to experience difficulties in identifying initial and final sounds and segmenting words into syllables, further underscoring the importance of introducing phonological interventions during early childhood (Pratiwi, 2020; Pratiwi et al., 2023). Locally developed reading media have also been trialled in Tasikmalaya elementary classrooms (Nurmeisa et al., 2025), although such work has addressed beginning reading rather than phonological awareness as such. Two qualifications should be attached to this evidence base. First, most intervention evidence originates in English-dominant contexts, whose deep orthography places unusually heavy demands on phoneme-level processing (Seymour et al., 2003; Ziegler & Goswami, 2005). Second, Indonesian has a highly transparent orthography and a predominantly consonant-vowel syllable structure, which makes larger phonological units, particularly the syllable, more salient for beginning readers (Winkel & Widjaja, 2007; Moeliono et al., 2017). Evidence obtained in English therefore cannot be transferred directly; the sequencing and emphasis of phonological activities require contextual adaptation.

To situate the study within current research trends, a bibliometric mapping was conducted. The mapping serves as supplementary justification for the research gap and is not a primary data source; the empirical basis of the design is the field-based needs analysis reported below. Publication records related to *phonological awareness* were identified through Google Scholar using Publish or Perish for publications within the 2015–2025 period. Keyword co-occurrence was subsequently analyzed using VOSviewer based on the retrieved publication records. The resulting visualization is presented in Figure 1.

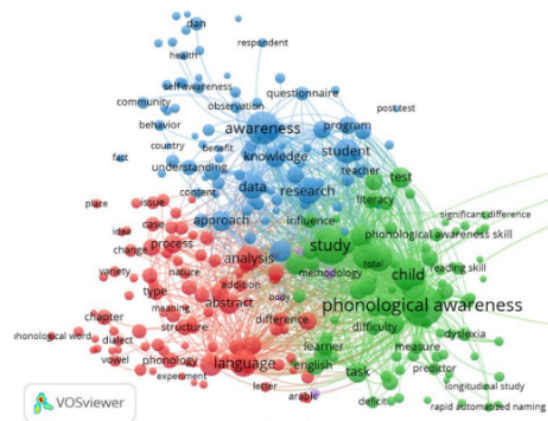


Fig. 1. Bibliometric visualization generated using VOSviewer

As illustrated in Figure 1, the keyword phonological awareness exhibits strong associations with a range of research topics, including child, reading skill, literacy, language, study, research, and analysis. This pattern suggests that existing research has primarily focused on the relationship between phonological awareness and early reading development, language acquisition, and children's literacy skills. However, its connections with topics related to intervention model development, instructional resources, and contextual implementation in early childhood education remain relatively limited. These bibliometric findings indicate that the development of an early literacy intervention model grounded in a phonological awareness approach represents an important and underexplored area for future research. Read alongside the field findings, the map indicates that phonological awareness has been studied predominantly as a predictor variable rather than as an object of instructional design. The two sources of evidence used in this study therefore play distinct and complementary roles: the mapping establishes that a design-oriented gap exists in the published literature, whereas the needs analysis specifies what a context-appropriate response to that gap must contain.

Drawing on the findings of previous studies and the bibliometric analysis, a clear research gap can be identified. Most existing studies have examined the influence of phonological awareness on reading achievement, mapped children's phonological skills, or investigated teacher competence through professional development programs. In contrast, studies devoted to the systematic development and validation of an early literacy intervention model based on phonological awareness, specifically tailored to the characteristics of early childhood education in Indonesia, remain scarce. Given the distinctive linguistic, cultural, and educational contexts of Indonesia, there is a pressing need for a contextually relevant intervention model that can be implemented effectively by teachers.

To address this gap, the present study develops an early literacy intervention model based on a phonological awareness approach within the ADDIE framework (Branch, 2009) and the educational design research tradition (Plomp & Nieveen, 2013). The novelty of the proposed model lies in three features. First, it is derived from an empirical needs analysis conducted in Indonesian kindergarten and first-grade classrooms rather than adapted from an existing English-language programme. Second, its activity hierarchy is sequenced with reference to the phonological characteristics of Indonesian—a transparent orthography with predominantly consonant–vowel syllables—so that syllable-level work precedes phoneme-level work (Winskel & Widjaja, 2007; Ziegler & Goswami, 2005). Third, assessment is embedded within play-based activities rather than administered as a separate formal test, so that teachers can monitor progress without specialised training. The full research programme comprises all five ADDIE phases; this article reports the Analysis and Design phases only.

Accordingly, this article addresses two research questions: (1) what are the phonological awareness profiles of Group B kindergarten and first-grade children, and what are their teachers' instructional needs, in Tasikmalaya City? and (2) what design principles and conceptual prototype follow from those needs? Claims regarding the validity, practicality, and effectiveness of the resulting model are deliberately withheld, since these can only be examined in the Development, Implementation, and Evaluation phases.

Method

1. Research Design and Scope of This Article

This study employed a Research and Development (R&D) approach using the ADDIE instructional design model, which comprises five phases: Analysis, Design, Development, Implementation, and Evaluation (Branch, 2009). ADDIE was selected because it provides a systematic route from needs identification to product development and evaluation and is compatible with educational design research.

in which preliminary design decisions are informed by an analysis of contextual needs (Plomp & Nieveen, 2013).

This article reports only the Analysis and Design phases of a broader ADDIE-based R&D project. The Development, Implementation, and Evaluation phases had not been conducted at the time of writing and are therefore presented only as planned subsequent stages. Consequently, this article does not make claims regarding the validity, practicality, or effectiveness of the proposed instructional model.

2. Setting and Participants

The Analysis phase was conducted in one kindergarten (TK K) and one elementary school (SD G) in Tasikmalaya City, West Java, Indonesia. The schools were selected purposively because both provided the relevant educational levels, namely Group B kindergarten and Grade 1 elementary education, and granted access and permission for the research activities.

The participants comprised 60 children and 12 teachers. The children consisted of 30 Group B kindergarten children aged 5–6 years and 30 Grade 1 elementary students aged 6–7 years. The Group B group comprised 12 boys and 18 girls, while the Grade 1 group comprised 14 boys and 16 girls. The children's everyday language background involved Sundanese and Indonesian. The children's linguistic background is also relevant to the interpretation of phonological performance. Research on phonological acquisition in Indonesian regional languages has demonstrated that children's early phonological development is shaped by the sound systems present in their everyday linguistic environment (Dzikriya & Meilawati, 2021). Although the present study did not compare Sundanese and Indonesian phonological development, the bilingual or multilingual language environment should therefore be considered when interpreting children's responses to speech-sound tasks. Children were included when they were enrolled in the participating classes and participated in the assessment activities. Children who did not complete the entire sequence of activities were not included in the assessment analysis.

The 12 participating teachers comprised six early childhood education teachers and six early-grade elementary teachers. Their teaching experience ranged from 7 to 20 years, and all held bachelor's degrees (S1).

3. Instruments and Data Collection

Play-based phonological awareness assessment. Children's phonological awareness was assessed individually through a sequence of play-based activities rather than through a formal paper-and-pencil test. The assessment was designed to resemble ordinary classroom activities and included five types of tasks: object naming, initial-sound identification, syllable segmentation, rhyme recognition, and discrimination of minimal pairs contrasting in voicing (/b/-/p/, /d/-/t/, and /k/-/g/). Picture stimuli were selected from vocabulary familiar to children in the local context, including animals, fruits, and classroom objects.

Children's responses were recorded as correct or incorrect. Performance was subsequently classified into able and not-yet-able categories for each activity based on the assessment criteria applied during data collection. The assessment was conducted by the researcher and supported by a second assessor to facilitate independent scoring. The two assessors independently recorded children's responses, and the resulting scores were compared to ensure consistency in scoring.

The assessment materials were reviewed by experts before data collection. Expert review involved specialists in early childhood and primary education as well as a language expert to examine the developmental appropriateness, instructional relevance, and linguistic suitability of the assessment activities.

The need for developmentally appropriate and contextually relevant assessment is also supported by recent Indonesian evidence. Christianti (2024) developed and tested an early literacy assessment for children aged 4–7 years that included oral language, written language, phonological awareness, alphabetic knowledge, and grapheme–phoneme correspondence. This evidence supports the use of phonological awareness as one component of a broader early literacy assessment framework while also highlighting the importance of establishing the validity and reliability of assessment instruments.

Recent Indonesian research has likewise emphasized that assessment instruments for beginning reading should undergo systematic validity evaluation before being used to describe children's developmental performance (Pratiwi et al., 2021). Accordingly, the present assessment should be understood as a needs-analysis instrument rather than a standardized diagnostic measure.

Classroom observation

Classroom literacy instruction was observed twice in each participating educational setting using a semi-structured observation sheet. The observation focused on the types of literacy activities implemented, the presence or absence of explicit phonological awareness activities, the instructional media used, and the ways teachers monitored children's literacy development.

Semi-structured teacher interviews

All 12 teachers were interviewed individually for approximately 15 minutes in Indonesian. The interviews were audio-recorded with the participants' permission and subsequently transcribed. The interview guide addressed four main areas: current literacy practices, teachers' understanding of phonological awareness, the availability and use of instructional resources, and teachers' perceived needs for supporting children's early literacy development.

4. Document Analysis

Document analysis was conducted using relevant instructional and assessment documents, including lesson plans and children's developmental assessment records from the 2025 academic year. These documents were examined to identify the extent to which literacy and phonological awareness objectives or indicators were represented in the planned instructional and assessment practices.

5. Data Analysis

Assessment data were analyzed descriptively by calculating the proportion of children demonstrating the expected performance in each phonological awareness activity. The results were presented separately for the Group B kindergarten and Grade 1 groups to identify differences in performance patterns between the two educational levels.

Interview transcripts, classroom observation notes, and documentary data were analyzed thematically. Initial codes were generated from the data and subsequently organized into broader categories concerning instructional practices, teacher understanding, and instructional resource needs. ATLAS.ti was used to support the organization and management of qualitative data.

The assessment, interview, observation, and documentary data were considered together to identify convergent and complementary evidence regarding children's phonological awareness and the instructional conditions surrounding early literacy learning.

6. Design Phase Procedure

In the Design phase, the needs identified during the Analysis phase were translated into corresponding design responses and intended instructional functions. The design process drew on three sources: the findings of the needs analysis, the developmental progression of phonological awareness reported in the literature [18,34], and relevant phonological characteristics of Indonesian (Moeliono et al., 2017; Winskel & Widjaja, 2007).

The output of this phase was a conceptual prototype consisting of learning objectives, instructional syntax, an activity hierarchy, instructional media, and an assessment system. The prototype represents a preliminary design hypothesis derived from the identified contextual needs and relevant theoretical and empirical literature. It had not yet undergone expert validation or classroom trial at the time of this study.

7. Ethical Considerations

Permission to conduct the research was obtained from the participating schools. Parents or guardians provided consent for children's participation, and participating teachers provided informed consent. The research activities were conducted within the regular school context, and all participant information was treated confidentially and anonymized during data processing and reporting. No identifying information about the participating children, teachers, or schools is reported in this article. The schools are therefore referred to using pseudonyms (TK K and SD G), and participant information was anonymized during data processing and reporting.

9. Planned Subsequent Phases

The remaining three ADDIE phases are planned as subsequent stages of the broader R&D project and are not reported as completed procedures in this article. In the Development phase, the preliminary prototype will be elaborated into teacher and child learning materials and reviewed by relevant experts, followed by readability and usability checks with teachers. In the Implementation phase, the revised model will be trialed in kindergarten and Grade 1 classrooms to examine its implementation in authentic instructional settings. In the Evaluation phase, evidence from the preceding stages will be synthesized to assess the model's validity, practicality, and effectiveness. These stages remain planned activities and therefore do not constitute findings of the present article.

Results and Discussion

Need Analysis for Model Development

The initial phase of developing a phonological awareness-based early literacy intervention model was conducted through a needs assessment. This analysis aimed to identify children's initial phonological awareness profiles, teachers' existing literacy instructional practices, and teachers' needs for an instructional model that could support early literacy development. The findings from this phase served as the basis for designing the intervention model, ensuring that the developed product was aligned with children's characteristics and the actual learning context.

The importance of establishing an initial developmental profile before designing instructional support is consistent with recent Indonesian work on early literacy mapping. Laksana et al. (2023) demonstrated the value of systematically mapping children's initial literacy-related competencies as a basis for identifying developmental needs and planning appropriate educational responses.

As described in the Method section, the needs analysis involved 60 children—30 Group B kindergarten children and 30 first-grade elementary students—and 12 teachers in one kindergarten and one early-grade elementary school in Tasikmalaya City, Indonesia. Data were collected through classroom observations, play-based phonological awareness assessments, semi-structured teacher interviews, and document analysis.

The phonological awareness assessment was designed in the form of play-based activities to accommodate children's developmental characteristics. Each child participated in several activity stations designed to assess their ability to recognize object names, identify initial word sounds, segment syllables, recognize simple rhymes, and distinguish sounds with similar articulatory features. The activities began with children coloring pictures of animals or objects, followed by naming the pictures, identifying initial sounds, determining the number of syllables, and imitating specific sounds associated with the images. This approach was selected to ensure that the assessment process was conducted in a natural setting and did not create excessive pressure for children.

The assessment results showed that most children were able to recognize and accurately name the presented objects. In the kindergarten group, approximately 87% of children were able to correctly identify object names, while the proportion among first-grade elementary school students exceeded 95%. These findings indicate that children's receptive and expressive vocabulary development had progressed relatively well.

However, children's phonological awareness skills demonstrated considerable variation. Regarding initial sound identification, only approximately 43% of kindergarten children were able to provide consistently correct responses, whereas the percentage increased to approximately 68% among early-grade elementary school students. The difficulties were particularly apparent when children were required to distinguish sounds with similar articulatory characteristics, such as /b/ and /p/, /d/ and /t/, and /k/ and /g/.

Syllable segmentation skills were also not yet optimally developed. Most children were able to segment two-syllable words but experienced increasing difficulties when processing words consisting of three to four syllables. In the kindergarten group, only around half of the children were able to perform syllable segmentation accurately, while early-grade elementary school students demonstrated relatively better performance, although their abilities were not yet fully consistent.

Greater difficulties were observed in rhyme recognition and simple phoneme manipulation tasks. Most children were unable to identify words with similar ending sounds or generate new words after the deletion of a particular phoneme. These findings suggest that children's phonological awareness development remains at an emerging stage and requires more systematic stimulation through structured learning activities.

In addition to assessing children's phonological awareness skills, this study examined literacy instructional practices implemented by teachers. Interview findings revealed that all teachers had integrated literacy activities since the beginning of the academic year through letter recognition, shared reading activities, alphabet songs, letter card activities, and copying exercises. Nevertheless, teachers acknowledged that these activities were not specifically designed to develop phonological awareness skills.

Most teachers associated reading readiness primarily with alphabet recognition. The concept of phonological awareness as a foundational pre-reading skill remained relatively unfamiliar to teachers. Consequently, activities involving sound games, syllable segmentation, rhyme identification, and phoneme manipulation had not yet become part of regular classroom instruction.

Teachers also reported that they had not previously had access to instructional resources specifically incorporating phonological awareness activities. They expressed the need for practical and easily implementable guidelines that correspond with young children's learning characteristics. The expected instructional module was not limited to theoretical explanations but also needed to include examples of play-based activities, instructional media, developmental indicators, and simple assessment procedures.

The findings from the needs analysis revealed a gap between existing literacy practices in the field and the requirements for developing children's early literacy skills. On the one hand, children require gradual and systematic stimulation to strengthen their phonological awareness; on the other hand, teachers lack an instructional model capable of addressing these developmental needs. Therefore, a phonological awareness-based early literacy intervention model needs to be developed based on authentic classroom conditions and contextual requirements. Results of need analysis can be seen in Table 1.

Table 1. Mapping of Identified Needs, Design Responses, and Intended Instructional Functions

<i>Identified Need (Analysis Phase)</i>	<i>Design Response (Design Phase)</i>	<i>Intended Instructional Function</i>
Initial-sound identification is inconsistent, especially for minimal pairs contrasting in voicing (/b/-/p/, /d/-/t/, /k/-/g/)	A dedicated Sound Exploration stage in the syntax, plus activities built on familiar picture pairs that differ by a single voicing feature	Builds phoneme-level discrimination before sound-symbol mapping is introduced
Syllable segmentation breaks down at words of three or more syllables	Syllable activities sequenced from two-syllable to four-syllable words, supported by clapping and whole-body movement (Stages 3–4)	Establishes the syllable as a stable intermediate unit, consistent with the consonant-vowel structure of Indonesian
Rhyme recognition and phoneme manipulation are largely absent	Rhyme placed early as a listening task (Stage 2) but manipulation placed at the upper end of the hierarchy (Stages 7–8)	Prevents premature phoneme-level demands while retaining rhyme as an accessible entry point
Teachers equate reading readiness with alphabet recognition	Instructional syntax that opens with sound exploration before any written symbol is presented, with letters introduced later rather than removed	Repositions the speech sound as the entry point of literacy instruction without displacing alphabet learning
No instructional resources specifically targeting phonological awareness are available	Teacher module containing activity examples, media alternatives, developmental indicators, and simple assessment procedures	Makes the model usable by teachers without specialised training or purpose-built materials
Assessment is understood as separate, formal testing	Observation sheet embedded in the play activities themselves	Permits continuous progress monitoring without exposing children to test conditions
Two developmental levels (Group B and Grade 1) are addressed within one framework	A common instructional syntax combined with differentiated entry stages and differing stimulus complexity	Accommodates developmental differences without requiring two separate models

Principles of the Intervention Model Design

Based on the findings of the needs analysis, the intervention model was designed based on five fundamental principles to ensure that the developed model aligns with children's developmental characteristics and teachers' practical needs in classroom settings.

The first principle is the gradual development of phonological awareness skills. The learning activities were structured according to the developmental hierarchy of phonological awareness, beginning with basic abilities such as recognizing environmental sounds and rhymes, followed by syllable identification, word segmentation, and simple phoneme manipulation. This sequential arrangement was intended to ensure that each activity corresponds with children's language development levels.

The second principle is play-based learning. All activities were designed in the form of educational games, songs, picture-based stories, sound card games, and motor activities, allowing children to engage in meaningful learning experiences in an enjoyable environment without experiencing excessive academic pressure. Demonstrated the use of interactive game-based media to stimulate children's language skills, supporting the design principle that instructional activities should combine active participation with developmentally appropriate stimuli (Satyadewi et al., 2024).

The use of play as an instructional vehicle is also supported by recent Indonesian research demonstrating that literacy activities can be embedded in children's everyday classroom play. Christianti (2023) reported that literacy games can provide varied opportunities for children to engage with listening, speaking, reading, and writing activities while maintaining active participation and enjoyment.

The third principle is contextual learning. The instructional materials incorporate vocabulary that is familiar to children's daily experiences, including animal names, fruits, objects commonly found in the school environment, and elements of the surrounding socio-cultural context. This contextual approach is expected to facilitate children's understanding of the relationship between speech sounds and real-life experiences.

The selection of familiar vocabulary is also important in early childhood literacy materials. Wiedarti et al. (2022) examined vocabulary characteristics in electronic books intended for Indonesian early childhood learners, highlighting the relevance of considering the linguistic content of learning materials when designing literacy experiences for young children.

The emphasis on contextual learning is consistent with Indonesian research showing that learning activities grounded in children's familiar cultural environments can be used to support language

development. Meiyanti et al. (2022) for example, developed a local-wisdom-based market game for kindergarten children, illustrating the potential value of connecting instructional activities with experiences and vocabulary that are meaningful within children's everyday contexts.

The fourth principle is practicality and ease of implementation for teachers. The model was developed by considering the actual conditions of educational settings, allowing all activities to be implemented using simple and readily available materials. Teachers do not require specialized training or expensive resources to implement the model effectively.

The fifth principle is the integration of assessment into the learning process. Phonological awareness assessment is not conducted through formal testing procedures; instead, it is embedded within play-based activities, enabling teachers to continuously observe and monitor children's developmental progress.

These five principles serve as the conceptual foundation for the design. They are intended to give the resulting model both a defensible theoretical basis and practical relevance for real classrooms; whether that intention is met is a question for the validation and implementation phases. The design principles are summarized in the Figure 2.



Fig. 2. Design Principles of the Intervention Mode

Results of the Phonological Awareness-Based Early Literacy Intervention Model Design

The findings from the needs analysis served as the foundation for designing the phonological awareness-based early literacy intervention model. The model design process was conducted during the Design phase of the ADDIE framework by considering three primary aspects: children's language developmental characteristics, teachers' needs as model users, and theoretical perspectives on phonological awareness and early literacy development. These three aspects were integrated into an intervention model design that can be implemented in both early childhood education and early-grade elementary school settings.

The developed model was designed as an instructional system that integrates phonological awareness activities into children's daily play-based learning experiences. Unlike conventional literacy instruction, which has predominantly emphasised letter recognition and written symbols, this model treats the speech sound as the primary unit of attention at the point of entry, with sound-symbol relationships introduced

progressively rather than withheld. Activities within the model are therefore structured from basic phonological abilities towards more complex phonological skills.

Conceptually, the intervention model consists of five main components: learning objectives, instructional syntax, phonological activities, instructional media, and child development assessment. These components are interconnected and function as an integrated instructional system to support children's early literacy development can be seen in Table 2.

Table 2. Components of the Phonological Awareness-Based Early Literacy Intervention Model

<i>Component</i>	<i>Description</i>
Learning objectives	To develop children's phonological awareness skills as a foundation for early literacy development.
Instructional syntax	Learning stages integrating an introductory activity, sound exploration, phonological play activities, reflection, and assessment.
Phonological activities	Sound games, initial sound identification, syllable segmentation, rhyme activities, simple phoneme manipulation, and sound-symbol matching activities.
Instructional media	Picture cards, letter cards, sound cards, concrete objects, picture storybooks, songs, board games, and simple digital media. Digital educational games can facilitate children's participation in literacy-related activities, including the development of awareness of relationships between spoken sounds and written symbols (Pancawati et al., 2024).
Assessment	Authentic observation using phonological development assessment sheets conducted throughout the learning activities.

Based on these components, the model was designed using a flexible instructional syntax that can be implemented in both whole-class learning activities and small-group learning settings. The feasibility of integrating literacy development with attractive and child-centred instructional media is also reflected in recent Indonesian development research. Winnuly et al. (2023), using an ADDIE-oriented development framework, showed the potential of interactive storybook media to support literacy activities through learning experiences that combine storytelling and play. This supports the present design decision to include varied instructional media rather than relying on a single type of literacy resource. The instructional syntax consists of five main stages, as presented in Table 3.

Table 3. Instructional Syntax of the Intervention Model

<i>Stages</i>	<i>Teacher Activities</i>	<i>Children's Activities</i>
Orientation	The teacher establishes a supportive learning environment through songs, stories, or simple games.	Children participate in the introductory activities and observe the stimuli provided by the teacher.
Sound Exploration	The teacher introduces various sounds through pictures, songs, and concrete objects.	Children recognize and imitate various sounds they hear.
Phonological Activities	The teacher facilitates phonological games aligned with children's developmental indicators.	Children engage in play-based activities while identifying initial sounds, syllables, rhymes, and simple phonemes.
<i>Stages</i>	<i>Teacher Activities</i>	<i>Children's Activities</i>
Reflection	The teacher encourages children to reflect on the activities that have been completed.	Children share their learning experiences and present the results of their activities.
Assessment	The teacher observes children's development using an assessment sheet.	Children complete the activities without experiencing a formal assessment process.

In addition to developing the instructional syntax, this study also produced a sequence of phonological activities structured according to the developmental hierarchy of children's phonological awareness skills. The activities were arranged progressively, from the most basic abilities to more complex skills, to ensure alignment with children's language development stages can be seen in Table 4.

Table 4. Stages of Phonological Awareness Activities

<i>Stages</i>	<i>Activities</i>
Stage 1	Recognizing environmental and animal sounds
Stage 2	Recognizing simple rhymes
Stage 3	Identifying syllables
Stage 4	Segmenting words into syllables
Stage 5	Identifying initial word sounds
Stage 6	Identifying final word sounds
Stage 7	Blending sounds into words
Stage 8	Simple phoneme manipulation

The sequential arrangement of activities was intended to provide children with continuous and meaningful learning experiences. Teachers can adjust the level of activity difficulty based on each child's developmental achievements, allowing the learning process to become more adaptive and responsive to individual needs.

Differentiation for Kindergarten and First-Grade Learners

Although the model addresses both Group B kindergarten children and first-grade elementary students, the two groups differ in phonological attainment, instructional time, and curricular demands, and the design accommodates these differences in three ways rather than treating the groups as equivalent. First, the entry point differs: kindergarten classes are expected to begin at Stages 1–2 (environmental sounds and rhyme), whereas first-grade classes, whose assessed performance on initial-sound identification was higher (approximately 68% against 43%), may begin at Stages 4–5. Second, stimulus complexity differs: two-syllable words predominate in kindergarten, while three- and four-syllable words and voicing minimal pairs are used in Grade 1. Third, the relation to print differs: kindergarten activities remain predominantly oral, whereas in Grade 1 the same activities are progressively linked to letters so that phonological work supports the sound–symbol instruction the curriculum already requires. The instructional syntax itself is held constant across both groups to keep the model manageable for teachers. Whether this single-syntax, differentiated-content approach is workable in practice is an empirical question for the Implementation phase.

The use of game-based activities may also be particularly relevant for the first-grade component of the model. Recent Indonesian research has shown that instructional games can be used to support beginning reading activities among Grade 1 learners (Arianti & Kristiantari, 2024). This provides contextual support for retaining playful formats while progressively increasing the complexity of literacy tasks in the elementary setting.

In addition to learning activities, the model also generated a preliminary design of supporting instructional materials that will be developed in the subsequent phase. These supporting materials include a teacher module, children's activity book, phonological game media, and developmental assessment instruments. The teacher module was designed to include implementation guidelines, examples of learning activities, alternative instructional media, and developmental indicators for each activity.

Overall, the design outcomes of this study resulted in a conceptual prototype of a phonological awareness-based early literacy intervention model consisting of instructional components, implementation syntax, phonological activities, instructional media, and an assessment system. This prototype serves as the foundation for the subsequent Development phase of the ADDIE framework, which will involve expert validation, readability testing, model revision, and implementation in early childhood education and early-grade elementary school settings.

Discussion

The design outcomes indicate that the development process was directed not merely at producing instructional materials but at establishing an instructional system that integrates language development, phonological awareness theory, and the learning characteristics of young children. Unlike literacy instruction that emphasises alphabet recognition almost exclusively, the model positions phonological awareness as a foundational component of early literacy that is developed alongside, rather than strictly before, children's engagement with print. Phonological awareness and print knowledge are understood here as developing reciprocally: phonological skill supports the acquisition of letter–sound correspondences, and learning to read in turn sharpens phonemic representation (Goswami, 2008; Zuchdi et al., 2021). Alphabet knowledge instruction has demonstrable value (Piasta & Wagner, 2010) and read-alouds that engage children with print support emergent literacy (Justice & Sofka, 2010); the argument advanced here is therefore not that such activities be replaced, but that sound-level work be made explicit and systematic alongside them.

The hierarchical sequence of activities treats phonological awareness development as a gradual and progressive process. The model accordingly encourages teachers to give children extended opportunity to listen to, discriminate, and manipulate sounds through play-based activities before letter–sound relationships become the dominant focus of instruction. This sequence is a design assumption grounded in the developmental hierarchy reported in the literature (Anthony & Francis, 2005; Anthony & Lonigan, 2004) and in the needs-analysis findings; whether it in fact supports reading readiness in these classrooms remains to be tested.

The sequence also reflects the phonological characteristics of Indonesian. Indonesian has a highly transparent orthography, in which grapheme–phoneme correspondences are almost entirely consistent, and a predominantly consonant–vowel syllable structure with simple onsets and few consonant clusters in native vocabulary (Moeliono et al., 2017). In transparent orthographies, beginning readers attain accurate

decoding earlier and rely more heavily on larger phonological units—particularly the syllable—than readers of English do (Seymour et al., 2003; Ziegler & Goswami, 2005). This is why the activity hierarchy places syllable identification and segmentation (Stages 3–4) before phoneme identification and manipulation (Stages 5–8), rather than foregrounding phoneme awareness from the outset as programmes developed for English typically do. The emphasis on voicing contrasts likewise responds to a specific finding of the needs analysis rather than to a general prescription, and is consistent with evidence that Indonesian beginning readers' phonological skills and letter knowledge develop in close association with early word reading and spelling (Winskel & Widjaja, 2007).

A related caution concerns the evidential basis of the approach. Meta-analytic evidence that explicit phonological and phonemic awareness instruction improves reading outcomes is substantial (Ehri et al., 2001; Melby-Lervåg et al., 2012) but it is drawn overwhelmingly from English and other orthographies that are deeper than Indonesian. Effect sizes reported in that literature cannot be assumed to transfer, and the present model should therefore be read as a contextual design hypothesis rather than as a local implementation of an established international programme.

From an implementation perspective, the model was designed to be practical and accessible for teachers. All activities use simple instructional media that are ordinarily available in the school environment, so that implementation should not depend on specialized facilities or resources. This flexibility is an intended design feature rather than a demonstrated property. Whether teachers can in fact implement the activities with the media available to them, and whether the model adapts across settings with differing resource levels, can be established only through the readability, usability, and implementation testing planned for the subsequent phases. The potential of game-based media is further supported by Winardi & Widiana (2024), who developed educational game activities designed to stimulate early childhood language skills. Although the present model does not depend on digital technology, such evidence supports the broader design principle of presenting language-learning tasks through engaging, interactive, and developmentally appropriate activities.

Overall, the findings indicate that the proposed intervention model is grounded both in theoretical accounts of phonological development and in empirical needs identified in authentic educational settings. This provides a defensible basis for proceeding to the Development phase, but it does not constitute evidence that the model works: the claims made here concern the rationale of the design, not its effects.

The study received ethical approval from the Research Ethics Committee of Universitas Muhammadiyah Tasikmalaya prior to its implementation (Ethical Approval No. 01/EC/KEP-UMTAS/I/2026). This approval confirms that the study was reviewed in accordance with the applicable ethical requirements for research involving human participants. The research procedures were conducted in accordance with the approved protocol, including the involvement of children and the collection and handling of research data.

Several limitations should be noted. The needs analysis was conducted in a single kindergarten and a single elementary school in one city, so the resulting profile of needs is local and is not representative of Indonesian early childhood education generally. The phonological awareness tasks were developed for this study and have not yet undergone psychometric evaluation; the percentages reported should therefore be read as descriptive indicators of classroom-level difficulty rather than as scores from a validated instrument. The bibliometric mapping functions only as supplementary justification and does not carry the analytical weight of the field data. Most importantly, the model has not been validated by experts, trialed with children, or evaluated for effectiveness; every statement about its practicality, adaptability, and instructional value is a design intention awaiting empirical test.

Conclusion

This study produced a design framework for an early literacy intervention model based on a phonological awareness approach, developed through a needs analysis conducted in early childhood education and early-grade elementary school settings. The findings revealed that children's phonological awareness skills require more structured stimulation, particularly in initial sound identification, syllable segmentation, and simple phoneme manipulation, while literacy instruction implemented by teachers remains largely dominated by alphabet recognition and beginning reading activities, indicating that phonological awareness development has not yet been systematically incorporated into the instructional process. Based on these findings, the intervention model was designed around five core principles: gradual phonological awareness development, play-based learning, contextual learning, practicality and ease of implementation for teachers, and the integration of assessment into the learning process. These principles served as the foundation for developing interconnected instructional syntax, phonological activities, instructional media, and assessment tools, forming a systematic intervention framework aligned with the

developmental characteristics of young children and early-grade elementary school students. The primary contribution of this study lies in developing a phonological awareness-based early literacy intervention model grounded in authentic field-based needs while integrating theoretical perspectives with contextual instructional practices, particularly through the explicit mapping between documented classroom needs and design decisions presented in Table 1, which makes the design rationale auditable and testable in subsequent phases. The resulting model is expected to serve as an initial reference for teachers in designing more structured literacy instruction and as a foundation for subsequent product development. However, this study is limited to the needs analysis and model design phases and therefore does not yet include expert validation, practicality testing, classroom implementation, or effectiveness testing. Future research should focus on the Development, Implementation, and Evaluation phases of the ADDIE model to validate and refine the proposed model and examine its practicality and effectiveness before broader implementation in early childhood education and early-grade elementary school settings.

Declarations

- Author contribution** : Anggia Suci Pratiwi conceptualized the study, designed the methodology, coordinated data collection, supervised the research process, and revised the manuscript. Yopa Taufik Saleh contributed to the development of research instruments, data analysis, and critical review of the manuscript. Meiliana Nurfitriani contributed to data collection, analysis of preliminary study findings, preparation of the manuscript draft, and article editing. All authors read, provided feedback on, and approved the final version of the manuscript. Karla Mahardika contributed to the development of the intervention module, data collection and field implementation in early childhood education settings, analysis of findings, and revision of the manuscript. Novia Nurul Mustami contributed to data collection and field implementation in early primary education settings, analysis of study findings, and documentation of the research process. Adelia Lintang Anjarika contributed to the development and review of assessment instruments, evaluation of their suitability for early childhood and early primary education contexts, and interpretation of assessment and validation findings. Warti contributed to the preliminary study, particularly through observations and interviews in early childhood and early primary education settings, systematic transcription of observation and interview data. All authors read, provided feedback on, and approved the final version of the manuscript.
- Funding statement** : This research was funded by the Muhammadiyah Research Grant Batch IX (2025/2026), organized by the Council for Higher Education, Research, and Development (Diktilitbang) of the Central Board of Muhammadiyah.
- Conflict of interest** : The authors declare that they have no conflicts of interest related to this research or the publication of this article.
- Ethics Approval** : This study obtained approval from the schools where the research was conducted. All participating teachers provided informed consent to participate, while the involvement of children was carried out after obtaining parental/guardian consent and permission from the schools.
- Additional information** : No additional information needs to be provided.

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