

Enhancing Early Childhood Literacy through the Development of Picture Storybooks: A Design-based Study

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ABSTRACT

Literacy is an important factor in determining learning readiness and academic success in early childhood at the primary school level. Teachers and parents need to prepare children's learning readiness with the support of quality and varied reading materials. This research aims to develop picture storybooks that are feasible in improving early childhood literacy skills. This study used the research and development method. The survey technique is used to analyze the needs of picture storybooks in children's learning activities at school, observation for children and questionnaires for teachers to analyze their response in using the product in learning activities. Another questionnaire was also used to see the quality of picture storybooks from an expert's perspective. The results of data analysis used a quantitative descriptive approach by observing the results of expert judgment and the results of product trials. Qualitative descriptive is also needed in analyzing the needs of picture storybooks. The results indicate that the developed picture storybooks received positive responses from teachers, who considered them engaging, appropriate, and supportive of interactive learning. Observations of children revealed increased participation, enthusiasm, and improved comprehension during literacy activities. Furthermore, expert judgment provided constructive feedback that contributed to the refinement and improvement of the book design, ensuring its quality in terms of content, language, and visual presentation. The developed picture storybooks are effective as a literacy learning medium for early childhood education. The findings imply that integrating visual and narrative elements in instructional materials, supported by design-based study, can significantly enhance children's literacy experiences. This study also suggests the potential for broader implementation and further development, including integration with digital learning environments.

Keywords: Early Childhood, Literacy Skills, Picture Storybooks, Design-Based Study

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PENDAHULUAN

Literacy development in early childhood has become a global concern because it strongly influences children's readiness for formal schooling, academic achievement, communication skills, and long-term cognitive development. Many people are currently discussing literacy, both on television and in the mass media. Early literacy has been one of the hot topics in recent years (Grote & Ortlieb, 2023). Talking about literacy is certainly not only for adults, early childhood also needs attention in terms of literacy. Literacy makes them learn to comprehend and use language to express their ideas, thoughts, feelings, and communicate with others (Septiani & Syaodih, 2021). This is also supported by research findings which show that early literacy is not only about the ability to read and write, but also encompasses the process of making sense of symbols, images and stories encountered through interaction with the learning

environment. Literacy experiences should be designed through developmentally appropriate activities that stimulate children's curiosity, imagination, language skills, and social interaction. Therefore, providing meaningful literacy stimulation during the early years is essential for establishing strong foundations for lifelong learning.

Early reading skills are the foundation of a child's literacy. The benefits of reading to young children are immense, and since parents are children's initial teachers as well as children's primary teachers, reading at home is essential. Explicitly, benefits of reading to zero- to eight-year-olds include an increase in cognitive development and language development as well as advancing vocabulary development, pre-reading skills, and emergent literacy skills (Gillespie, 2019).

A new paradigm in classroom learning highlights the fact that every child's learning needs are different. New and different systems need to be created to meet the needs of all children (Stone, 2018). A significant shift has taken place in intra-curricular activities, namely the learning process through the application of student-centred differentiated learning, which means adapting to the needs and characteristics of the child. The implementation of differentiated learning at early childhood education level aligns with the concept of learning through play, ensuring children receive appropriate support tailored to their developmental stage, cognitive development, and the appropriate learning environment provided by educators (Lestarinigrum, 2022), as every child has a different preferred learning style.

Recent studies have highlighted the importance of picture storybooks in supporting children's literacy experiences. Picture books can strengthen narrative comprehension, vocabulary acquisition, imagination, and emergent literacy skills (Altun, 2024; Niland, 2023). Other studies also indicate that interactive storybook reading contributes positively to oral language development, reading motivation, and mathematical understanding (Wheeler & Hill, 2021; Wang et al., 2024). Moreover, multimodal elements such as illustrations, symbols, and visual narratives can help children understand stories more effectively and engage actively in learning activities (Kumpulainen, 2018). These findings demonstrate that picture storybooks are not only reading materials but also meaningful instructional media that can support holistic child development.

The government is trying to make literacy one of the main focuses in school activities, known as Gerakan Literasi Sekolah (Kemdikbud, 2016). This is followed by the regulation of the foundation phase (early childhood) learning outcomes, one of which is the achievement of the basics of literacy (Kemdikbud, 2024). On the other, The PISA 2022 results are also a problem that needs to be resolved immediately regarding the description of the literacy skills of Indonesian children (OECD, 2023). Basic literacy activities have not been well implemented in schools (Rakhmawati & Mustadi, 2022), so not all students have strong reading and numeracy skills (Duda et al, 2023). Based on observations, children are able to read even at kindergarten age, but unfortunately they do not understand what they read. This leads to poor problem-solving skills later in life. On the other hand, interest in reading activities tends to be poor. Therefore, researchers want to contribute to add a variety of children's picture storybook that are in accordance with their cognitive development stage.

Several previous studies have explored the effectiveness of picture books in improving children's literacy and numeracy abilities. For example, Gunawan et al. (2023) developed picture storybook learning media to improve critical and creative thinking skills, while Billa et al. (2023) focused on inquiry-based picture books to enhance creativity. Gusmayanti and Ayriza (2023) examined picture storybooks in relation to theory of mind development, whereas Suzanne et al. (2024) investigated teachers' use of picture books for mathematical instruction. Other studies emphasized parental interaction during storybook reading (Wang et al., 2024) and children's reading attitudes (Altun et al., 2022). Although these studies demonstrate the educational value of picture storybooks, several research gaps remain.

First, previous studies generally focused on the effectiveness of picture books in isolated literacy or numeracy aspects without integrating literacy, interaction, visual engagement, and developmental stimulation simultaneously within one product design. Second, many studies

examined the use of existing books rather than developing new picture storybooks tailored to local educational needs and children's developmental stages. Third, only a limited number of studies employed a design-based research approach involving iterative revisions through expert validation, teacher feedback, and children's responses. Consequently, there is still insufficient evidence regarding how systematically designed picture storybooks can be developed, validated, revised, and implemented as meaningful literacy learning media in early childhood education.

This study is important because it addresses the practical problem of limited contextual and developmentally appropriate literacy materials in early childhood classrooms. The research contributes to improving children's literacy engagement, comprehension, interactive participation, and meaningful learning experiences through the development of innovative picture storybooks. In addition, the study supports teachers in implementing literacy-based learning aligned with differentiated instruction and child-centered pedagogy. This research lies in the integration of literacy stimulation, numeracy elements, interactive storytelling, visual communication, and developmental appropriateness within a systematically developed picture storybook using a design-based study approach. Unlike previous studies that mainly examined the use of existing books, this study develops and validates a contextual picture storybook through seven iterative stages involving experts, teachers, and children. Furthermore, this study combines literacy and numeracy support within one integrated early childhood learning medium. Therefore, the purpose of this study is to analyze the needs for picture storybooks in early childhood education settings and to develop a feasible, interactive, and developmentally appropriate picture storybook that can effectively support children's literacy learning experiences.

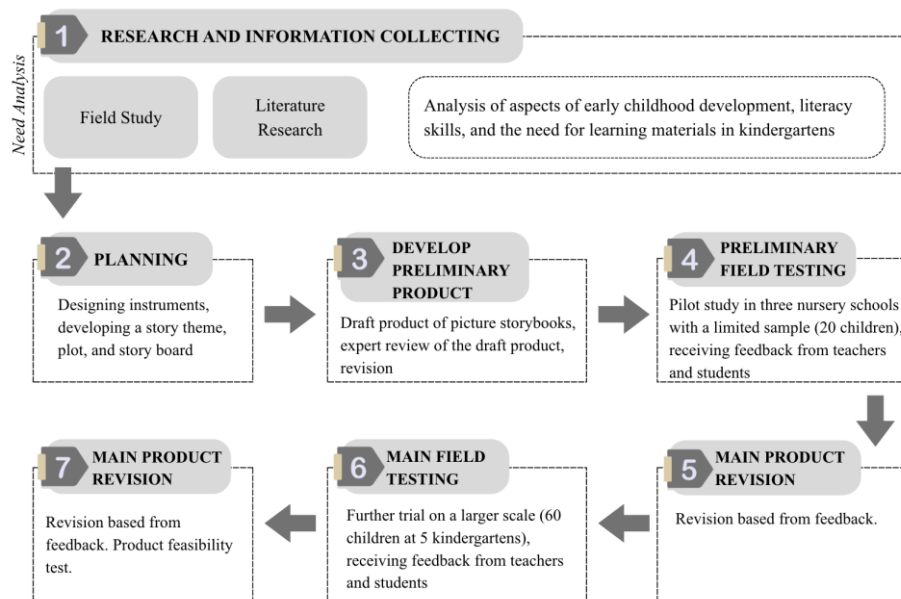
METHOD

This study used the design-based study which refers to research and development model adapted from Borg & Gall. Educational research and development is a process used to develop and validate educational products (Borg & Gall, 2003). This study used 7 development steps;

- 1) Research and information collecting
The first stage focused on identifying the need for picture storybooks in early childhood education institutions in Bandar Lampung City. Surveys were distributed to teachers and parents across five districts: Kedamaian, Way Halim, Tanjung Karang Barat, Sukarame, and Labuhan Ratu. The survey aimed to identify the availability of literacy media, teachers' challenges in literacy learning, children's interest in reading activities, and expectations regarding picture storybooks.
- 2) Planning
Based on the needs analysis results, the researchers designed the initial concept of the picture storybook. The planning stage included determining learning objectives, story themes, character design, literacy components, numeracy integration, and interactive learning elements. The researchers also mapped the learning outcomes in the National Curriculum foundation phase to ensure alignment with early childhood developmental standards. At this stage, the researchers selected story themes related to children's daily experiences to enhance contextual understanding and engagement. Vocabulary selection, illustration concepts, storyline structure, and interactive activities were also planned carefully according to children's cognitive and language development.
- 3) Develop preliminary form of product
The preliminary product consisted of a printed picture storybook integrating visual narratives, simple literacy activities, numeracy stimulation, and interactive storytelling elements. The product included colorful illustrations, simple vocabulary, number recognition activities, color matching activities, and guided interaction prompts.
- 4) Preliminary field testing
The preliminary field testing was conducted on a small group of children and teachers to identify the practicality and attractiveness of the product. Teachers implemented the storybook during literacy learning activities using read-aloud methods.

- 5) Main product revision
The main product revision is a draft revision based on the results of a trial run, which took into account feedback from teachers and pupils.
- 6) Main field testing
The revised product was implemented in broader classroom settings involving more children and teachers. The main field testing aimed to evaluate the effectiveness, practicality, and attractiveness of the revised picture storybook.
- 7) Operational product revision.
The final operational revision was conducted based on the results of the main field testing. Minor revisions focused on improving visual consistency, sentence effectiveness, instructional prompts, and layout organization.

Figure 1. Research Design



In collecting data, several techniques were used: 1) Survey, to map the needs of picture storybooks for early childhood in Bandar Lampung City; 2) Questionnaire, used to see the quality value based on the point of view of linguists and early childhood experts. In addition, it is used to find out the teacher's response to picture storybooks; 3) Observation, used to determine the child's response when learning using picture storybooks as a development product. The data analysis technique used a descriptive quantitative approach to see the needs of picture storybooks and book quality from the expert's point of view and teacher-student responses.

RESULT AND DISCUSSION

The results of this study will be outlined in the section below.

1. Research and Information Collecting

The findings indicated a high need for picture storybooks in all surveyed districts. Teachers reported that existing reading materials were limited, less interactive, and insufficiently aligned with children's developmental characteristics. Parents also expressed the need for more engaging reading materials that could stimulate children's interest in literacy activities at home. The survey results are presented below.

Table 1. Picture Storybooks Need Analysis

Districts	Respondent	Score	Category
Kedamaian	32	328	high
Way Halim	23	263	high
Tanjung Karang Barat	31	316	high
Sukarame	41	347	high
Labuhan Ratu	28	305	high

The results of the needs analysis showed a high tendency towards the demand for picture storybooks to be used in classroom learning activities. The respondents in the survey included teachers and parents. The highest demand for picture books is found in suburban areas, which, according to the respondents, account for the largest proportion. Therefore, the results of this needs analysis serve as the basis for the researcher to develop and design a picture storybook that teachers actually need as a teaching media in the meaningful learning.

2. Planning

At this stage, the researchers selected story themes related to children's daily experiences to enhance contextual understanding and engagement. Vocabulary selection, illustration concepts, storyline structure, and interactive activities were also planned carefully according to children's cognitive and language development.

3. Develop Preliminary Product

The preliminary product was then validated by linguists and early childhood education experts. The findings of the assessment by linguists and early childhood education experts are set out in the table below.

Tabel 2. Linguist Expert Result

Aspects	Total Score
Story Elements	62
Illustration	37
Format	65
Presentation Feasibility	71
Book Anatomy	72
Title Criteria	28

Language of The Text	31
TOTAL	363
CATEGORY	Good

Based on the results of the linguist's assessment, the picture storybook is good enough. The elements of the story presented are in accordance with the stage of early childhood development. It only needs to be improved in the illustration section to be clearer and able to tell stories. The anatomy of the book is appropriate for kindergarten children. An assessment was then carried out by an early year education expert. The results are shown in the table below.

Tabel 3. Early Year Education Expert

Aspects	Total Score
Suitability To The Learning Outcomes	22
Reading Level	24
Literacy Activities Supports	34
Numeracy Activities Supports	36
Developmental Stimulation	28
TOTAL	144
CATEGORY	Good

Based on the assessment of early childhood experts, this picture storybook is in accordance with the learning outcomes of the foundation phase. The Reading level is also appropriate for the age stage.

4. Preliminary Field-Testing and
The results showed that children demonstrated positive engagement during storytelling sessions. Most children showed enthusiasm toward the illustrations and actively participated in answering questions and discussing the story. However, several weaknesses were identified, including unclear illustrations, limited interactive prompts, and insufficient numeracy integration. Teacher responses also indicated that the product was generally appropriate but required revisions in visual presentation and language clarity.
5. Main Product Revision
At this stage, the draft product is revised based on feedback from experts and expert judgement.
6. Main Field-Testing Result
The results of the preliminary field testing and main field testing are described in this section, which is divided into sections for teachers (questionnaire with rating scale) and children (observation). The stories presented in early childhood learning activities certainly use an interactive approach. The teacher tells the narrative with a good method so that children are enthusiastic in hearing the story. The read aloud method is used by the teacher in presenting the story by displaying the storybook on the screen so that all children can see clearly.

Tabel 4. Teacher's Response

Aspects	Preliminary Field-Testing	Main Field-Testing
Format	3	4
Material	3	3,5
Illustration	2,5	4
Story	3,5	4
Average	3	3,9
CATEGORY	Good	Very Good

Tabel 5. Student's Response

Aspects	Preliminary Field-Testing	Main Field-Testing
Listening to The Story	3	3,5
Interest in Illustration	3,5	4
Character Recognition	2,6	3,5
Understanding of Story Content	3	3,5
Reading Numbers	2	3
Color Matching	3	3,5
Average	2,9	3,5
CATEGORY	Good	Very Good

7. Main Product Revision

The main product revision is a draft revision based on the results of a trial run, which took into account feedback from teachers and pupils. Here are the results of the revision of the picture book.

Figure 2. Main Product Revision Result





Figure 2 shows the revised results of the picture storybook development. In this revision, several aspects—both in terms of the illustrations and the story content—have drawn criticism from experts and teachers. In the first image, the author and illustrator should be credited on the book cover. In the second image, the choice of vocabulary needs to be revised. In the third image, there needs to be an addition of numeracy content within the story to support children's numeracy skills. In the fourth image, language experts suggest providing a story climax that is easy for children to understand. In the fifth image, the butterfly life cycle needs to be added, which can be explicitly explained by the teacher to make the story more engaging for the children. In the sixth image, interactive and persuasive sentences need to be added to encourage the children to retell the story.

DISCUSSION

The findings demonstrate that the developed picture storybook effectively supports children's literacy learning experiences. Teachers provided positive responses regarding the practicality, attractiveness, and relevance of the storybook for classroom learning activities. Observations also revealed increased student engagement, participation, comprehension, and enthusiasm during literacy activities. In addition, the integration of illustrations and interactive storytelling encouraged children to interact more actively with the learning material.

Children's books inform the formation of identity and can help young children appreciate people with individual characteristics that differ from their own (Monoyiou & Symeonidou, 2015). Picture books were recently shown effective for supporting early mathematical competencies (Suzane et al, 2024). Stories about natural daily experiences are also a form of literacy activities for early childhood (White et al, 2021). Short stories provide better narrative understanding for young children (Altun, 2024). The story can be made up of several multimodal texts, such as written text, images, symbols, photos, sounds and combinations of these (Kumpulainen, 2018).

Children need to see themselves reflected in books, and given that play and imagination are central to how young children experience life and learn, picture books featuring children engaged in imaginative play can be a vital resource for fostering a love of reading and cultivating a positive reading identity in young children (Niland, 2023). Children benefit from read-alouds with parental interaction, and these benefits include an increase in oral language skills, reading comprehension, vocabulary, and an increase in motivation to read (Wheeler & Hill, 2021). Other research results emphasize that relation between parent and child math talk during storybook reading and the importance of the features of learning materials on that talk (Wang et al, 2024). Children that do early numeracy activities at home more often tend to achieve better results in mathematics in the upper years of primary school (Hwang, 2020). However, children's home literacy environment, the number of books in their household, and maternal reading attitudes and reading habits were significantly related, accounting for 62% of the variance in children's reading attitudes (Altun et al, 2022). Numeracy skills can also be stimulated through the use of comics (Rasilah et al, 2026). Incorporating children's literature seems a powerful tool for teaching (Akerson et al, 2019).

Now how do teachers take a role in stimulating children's literacy. Incorrect understanding of concepts will have a negative impact on children in the future. The importance of educators' language and literacy knowledge as well as supporting good practice in learning reinforces early childhood literacy stimulation (Piasta et al, 2019). However, they did not feel confident in their ability to identify preschool children who were not meeting developmental language milestones (Weadman et al, 2022). Preschool teachers and primary school teachers must work in harmony and carry out consistent practices with each other in the process of teaching literacy (Ilhan, 2024). In addition, to ensure schools have high-quality teaching staff, trainee teachers need to be thoroughly prepared to teach mathematical concepts and numeracy through picture book reading activities (Green et al, 2025).

Teachers need to do various good practices, look for references on social media, and can even innovate to develop similar products to add to the variety of picture storybooks. The creation of picture books can enhance creative thinking and critical thinking (Gunawan et al., 2023); creativity (Billa et al., 2023); and theory of mind (Gusmiyanti & Ayriza, 2023). The selection of the right reading books will bring learning with a pleasant environment. Appropriate use of a variety of picture storybooks is a solution for successful learning in the classroom (Garces & Tupas, 2021). Thereby, joy is revealed in early childhood literacy practices involving interesting reading books (Nordstrom et al, 2024).

In stimulating early reading, there needs to be an appropriate stimulus. Picture storybooks may become a factor in stimulating children's literacy skills. Interactive book reading is an important activity to give children the opportunity for them to develop their early literacy skills (Sezgin et al, 2017). Children's books inform the formation of identity and can help young children appreciate people with individual characteristics that differ from their own (Monoyiou & Symeonidou, 2015). Interactive story reading in kindergarten impacts children's higher-level reading skills (Asadi et al, 2023). The government needs to pay more attention to the need to supply picture storybooks or similar children's readings equally to schools. Further policies are expected to support the improvement of literacy skills from an early age. Picture storybooks need to be included in the curriculum as well as recommendations for reading books for early childhood that are already available (Esteves, 2018).

CONCLUSION

This study demonstrates that the development of picture storybooks as a medium for early childhood literacy learning through a research-development approach has proven to be effective and relevant for use in meaningful learning. The resulting product not only meets theoretical and practical feasibility criteria but has also received a positive response from teachers as the primary users. Teachers assessed that the picture storybooks developed are capable of supporting a learning process that is more meaningful, interactive, and aligned with children's developmental characteristics. Furthermore, observations of pupils also indicate an increase in children's engagement and interest in literacy activities. Children appear more enthusiastic about participating in learning, more active in interacting with text and images, and demonstrate progress in their ability to comprehend stories. This suggests that the integration of visuals and narrative in picture storybooks facilitates a more meaningful learning process. Validation through expert judgement further reinforces the quality of the developed product. Constructive criticism and suggestions regarding content, language, illustrations, and design were subsequently used to refine the product to better align with the principles of early childhood learning. Consequently, the resulting picture books can be considered suitable and effective as a medium for stimulating the literacy skills of young children. The findings of this study have several important implications. In practical terms, this research provides an innovative alternative learning medium for teachers in developing the literacy skills of young children. Picture storybooks designed systematically can serve as an effective tool for creating learning experiences that are both enjoyable and educational. This research also opens up opportunities for further studies to test the effectiveness of picture storybooks on a larger scale or to integrate them with digital technology to enhance the quality of learning in the modern era.

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