

Deep Learning-Based Daily Activity Storybook for Early Childhood Literacy Skills

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Abstract

This study aims to examine the effectiveness of a deep learning-based daily activity storybook in enhancing early literacy skills among children aged 5–6 years. Employing a quantitative approach with a pre-experimental one-group pretest–posttest design, the research involved 22 children selected through purposive sampling. Data were collected using a validated and reliable literacy observation sheet (Aiken's $V = 0.84$ – 0.95 ; $\alpha = 0.91$; $ICC = 0.84$) measuring children's ability to comprehend symbols, use vocabulary, and express ideas meaningfully. Statistical analysis using the Paired Sample t -test revealed a significant difference between pretest ($M = 52.14$, $SD = 4.38$) and posttest ($M = 74.27$, $SD = 5.16$) scores, $t(21) = 13.42$, $p < 0.001$, with a very large effect size (Cohen's $d = 2.86$). The findings demonstrate that integrating deep learning principles into contextual storybooks substantially improves children's functional and expressive literacy. The study's novelty lies in combining literacy, communication, and experiential learning through a child-centered storytelling model. Practically, it offers teachers an innovative pedagogical tool aligned with the Merdeka Curriculum, fostering joyful and meaningful learning. This research contributes to strengthening the theoretical and practical foundation of deep learning-based literacy education in early childhood contexts.

Keywords: early childhood; early literacy; communication; deep learning; story book.

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INTRODUCTION

Globally, early literacy is recognized as one of the fundamental predictors of children's future academic success and socio-emotional development (OCDE, 2023; UNESCO, 2022). However, cross-contextual studies indicate that early literacy programs often emphasize decoding skills and symbol recognition over meaningful language use (Hulme & Snowling, 2013). A similar pattern is evident in Indonesia, where early literacy practices in early childhood education (ECE) remain focused on letter recognition and mechanical reading exercises (Valcárcel Jiménez dkk., 2024a). Such approaches limit children's opportunities to develop expressive communication skills and deeper comprehension of linguistic meaning.

Activities such as tracing letters, copying words, or memorizing syllables frequently dominate literacy instruction (Simmms & Smith, t.t.; Valcárcel Jiménez dkk., 2024b). While these tasks may help children become familiar with letter forms, an overly technical approach does not fully foster their understanding of the meaning and function of language (Daffa, 2024; DeBaryshe, 2023). Consequently, the literacy process often remains disconnected from children's real-life experiences and their ability to express ideas in meaningful ways (Muzakki dkk., 2022; Valcárcel Jiménez dkk., 2024b).

Literacy learning that is primarily oriented toward technical outcomes tends to reduce children's interest and emotional engagement (Eko Priyantini & Yusuf, 2020). In fact, early literacy should be a joyful, meaningful, and contextual process, one that connects language to children's everyday experiences (Choiriyah dkk., 2023). Experience-based literacy approaches, such as reading picture books, engaging in role play, and conducting simple projects, have been shown to enhance children's engagement and comprehension of reading materials (Cipolletti dkk., 2025).

Early childhood literacy encompasses far more than the ability to read and write; it involves understanding, expression, and the functional use of language within social contexts (Sallis JF, Owen N, 2008). Drawing on Vygotsky's sociocultural theory (Nicholas, Veresov, & Clark, 2021), language development occurs through meaningful social interactions supported by scaffolding and collaboration (Sarmiento-Campos dkk., 2022). Teachers serve as mediators who connect children's real-life experiences with functional language, accompanied by positive emotional support. The quality of teacher-child emotional interactions significantly influences language and literacy development by enhancing children's engagement (Rankin dkk., 2022) and their participation in reciprocal communication (Sun dkk., 2022). Moreover, preschoolers' communication skills are strong predictors of socio-emotional competence (Rautakoski dkk., 2021), which are further strengthened by high-quality teacher-child interactions (Yang dkk., 2021) and early gestural communication interventions (Farkas, 2024).

Although storytelling and the use of picture books have been widely implemented to improve children's expressive language skills (Rahayu & Dewi, 2021; Ramli, 2022), there remains a notable lack of research integrating daily activity storybooks that connect literacy experiences with children's real-life contexts and project-based learning environments. This gap highlights the need

for innovative models that effectively integrate literacy, communication, and experience-based learning in early childhood education.

One potential innovation is the daily activity storybook grounded in deep learning principles a storybook that narrates children's daily activities while linking them to their lived experiences. This model not only fosters technical literacy skills but also cultivates communication abilities, expressive competence, and socio-emotional development. Unfortunately, most previous studies have been limited to shared reading or conventional storytelling activities that do not actively involve children in the story creation process (Fadhilah & Purnamasari, 2025; Horst dkk., 2011; Rahayu & Dewi, 2021).

A storybook serves as a language- and visual-rich medium that stimulates children's thinking, imagination, and expressive abilities (Ramli, 2022). Deep learning emphasizes meaning-making, reflection, and the connection between experience and concept (Choiriyah dkk., 2023). The combination of both in a daily activity storybook enables children to express their personal experiences while deepening their language competence. Shared reading activities strengthen listening, speaking, and reading skills through dialogic interactions between teachers and children (Danniels & Pyle, 2023; McNally dkk., 2024). Deep learning helps children build character, creativity, collaboration, critical thinking, communication, and global citizenship (Fullan dkk., 2018). In early childhood education practice, this occurs when teachers connect story content with children's real-life experiences (Fullan dkk., 2017). The integration of storybook-based games extends learning experiences to become more active, reflective, and collaborative. Narrative play grounded in stories enhances communication, imagination, and problem-solving abilities (Ståhl dkk., 2025). Thus, games storybooks serve as pedagogical tools that foster meaningful literacy and deep communication among young children.

The context of Indonesia's Merdeka Curriculum, which emphasizes project- and experience-based learning, also aligns with this developmental direction. The curriculum seeks to cultivate children's character and literacy through meaningful and contextualized activities. However, its implementation still faces challenges, such as limited media availability, insufficient teacher training, and low parental involvement (Agustina & Depalina, 2025; Nasution & Harahap, 2024; Setiawan dkk., 2023).

The deep learning approach is an essential component of early childhood education curricula, as it focuses on building meaningful understanding through experience, reflection, and active engagement. This approach goes beyond emphasizing academic skills, it helps children connect new information to prior experiences (Mezirow, 2012), understand relationships among concepts (Hattie, 2008), and develop critical thinking and communication abilities (Fullan dkk., 2017). Within the context of early childhood education, deep learning stimulates communication skills through activities such as speaking, questioning, explaining, and reflective interaction. Children learn language in authentic contexts that are rich in meaning and emotion. Teachers act as facilitators who guide children in discovering meaning through exploration and scaffolded dialogue (Purdon, 2016). Therefore, this study develops a daily activity storybook based on deep

learning principles to enhance early literacy skills while supporting the Merdeka Curriculum and the National Literacy Movement.

Experiential learning positions children as active participants who learn through direct engagement, reflection, and exploration of their surroundings. Children construct understanding through real interactions rather than through verbal instruction, making experience the primary source of meaning-making. The inclusive play-based learning approach allows children to participate actively through exploration and open dialogue (Danniels & Pyle, 2023). Within this framework, project-based learning functions as a concrete form of experiential learning that promotes collaboration, creativity, and reflection (Parwoto dkk., 2024). Playful learning curricula have also been shown to enhance children's emotional and social engagement (Størksen, Rege, Solli, dkk., 2023). Play serves as a natural medium for children to express ideas, negotiate, and understand social relationships. Through guided play, teachers provide light scaffolding that effectively improves cognitive and social learning outcomes (Skene dkk., 2022). Furthermore, relational and sustainability-based play helps children develop empathy and environmental responsibility (Vartiainen dkk., 2024).

Based on the foregoing discussion, this study seeks to answer the research question: How can the development and implementation of a deep learning-based daily activity storybook enhance early literacy skills within the framework of the Merdeka Curriculum? Accordingly, the study hypothesizes that the use of a deep learning-based daily activity storybook will significantly improve early childhood literacy skills compared to conventional, technical, and mechanical literacy methods.

METHOD

This study employed a quantitative approach using a pre-experimental one-group pre-test post-test design to obtain preliminary evidence regarding the potential effectiveness of a deep learning-based daily activity storybook in improving children's communication skills. This design was selected because it enabled the researchers to compare children's communication performance before and after the intervention within a natural classroom setting. However, due to the absence of a control group, the findings should be interpreted as preliminary and do not permit definitive causal conclusions regarding the intervention's effects.

The research was conducted at an early childhood education institution (ECE) consisting of two learning groups, with a total population of 45 children aged 5–6 years. From this population, 22 children were selected as research participants through purposive sampling based on the following criteria: (1) aged 5–6 years, (2) actively participating in classroom activities, and (3) having obtained written parental or guardian consent.

The research procedure began with a pre-test to assess children's communication skills prior to the intervention. Subsequently, the participants engaged in play and storytelling activities using a deep learning-based daily activity storybook developed around children's real-life daily experiences. After

the intervention, a post-test was administered to examine changes in children's communication skills.

Data were collected using an observation sheet with a four-point Likert scale comprising indicators of children's communication skills, including the ability to recount experiences, express opinions, respond to questions comprehensively, and use newly acquired vocabulary appropriately. Prior to implementation, the instrument underwent expert judgment to establish content validity. Reliability was evaluated using Cronbach's Alpha ($\alpha \geq 0.70$) to assess internal consistency and the Intraclass Correlation Coefficient ($ICC > 0.75$) to ensure inter-rater agreement among observers.

The pre-test and post-test data were analyzed using inferential statistics. The Shapiro–Wilk test was first conducted to examine the normality of the data distribution because the sample size was fewer than 50 participants. If the data met the assumption of normality ($p > 0.05$), a paired-samples t-test was performed to compare the mean pre-test and post-test scores. Otherwise, the nonparametric Wilcoxon Signed-Rank Test was employed. These analyses provided preliminary quantitative evidence regarding changes in children's communication skills following the implementation of the deep learning–based daily activity storybook.

RESULTS AND DISCUSSION

The instrument used in this study was an observation sheet on early childhood literacy skills, developed based on the theory of early literacy development and Vygotsky's sociocultural approach (Nicholas, Veresov, & Cripps, 2021), as well as the principles of meaningful literacy within the context of deep learning (Choiriyah dkk., 2023). This instrument was designed to measure the extent to which children demonstrated functional and meaningful literacy abilities during learning activities using the daily activity storybook approach.

The instrument consisted of five main indicators of early literacy skills, namely:

1. The ability to recognize and understand symbols or words within the context of a story;
2. The ability to retell the story content using one's own words;
3. The ability to relate story content to personal experiences;
4. The ability to use new vocabulary introduced during reading activities; and
5. The ability to express ideas or messages through literacy activities (reading, writing, or storytelling).

Each indicator was elaborated into five to six items, measured using a four-point Likert scale (1 = not yet evident, 2 = emerging, 3 = developing as expected, 4 = developing very well).

Prior to data collection, the instrument underwent content validity testing by three experts in Early Childhood Education and Literacy Development. The experts evaluated the relevance and clarity of each item in relation to the theoretical constructs of early literacy skills. The results were analyzed using

Aiken's V, with coefficients ranging from 0.84 to 0.95, indicating that all items were highly valid and relevant to the literacy construct. No items were eliminated; however, two items were revised linguistically to ensure better contextual alignment with the daily activity storybook activities.

Internal reliability testing was conducted to assess inter-item consistency using Cronbach's Alpha, yielding a value of $\alpha = 0.91$, which indicates very high reliability (threshold ≥ 0.70). To ensure inter-rater consistency, an Inter-Rater Reliability (IRR) test was also conducted between two independent observers. The resulting Intraclass Correlation Coefficient (ICC) value of 0.84 ($p < 0.001$) demonstrated strong agreement between raters in evaluating children's literacy behaviors.

Table 1. Reliability Test

<i>Intraclass Correlation Coefficient</i>	<i>95% Confidence Interval</i>	<i>F</i>	<i>Sig.</i>
0.84	0.73 – 0.91	6.29	0.000
Interpretation	The inter-rater consistency was very high.	—	—

Thus, the results of the validity and reliability tests indicated that the early literacy observation sheet used in this study was valid, reliable, and suitable for measuring the effectiveness of the deep learning-based daily activity storybook in enhancing literacy skills among children aged 5–6 years.

After the instrument was confirmed to be valid and reliable, the analysis proceeded to examine the effectiveness of the deep learning-based daily activity storybook on early literacy skills. Descriptive analysis revealed that the children's average literacy scores increased significantly following the intervention. Before the treatment (pretest), the mean literacy score was $M = 52.14$ ($SD = 4.38$), while after participating in the learning activities using the daily activity storybook, the mean score increased to $M = 74.27$ ($SD = 5.16$). The improvement of 22.13 points indicates a substantial enhancement in children's literacy abilities, including symbol comprehension, vocabulary use, and the ability to express ideas through language.

The normality test using the Shapiro–Wilk test showed that the data were normally distributed ($p > 0.05$), allowing for further analysis using the parametric Paired Sample t-test. The results revealed a statistically significant difference between the pretest and posttest scores, $t(21) = 13.42$, $p < 0.001$, indicating that the implementation of the daily activity storybook had a significant positive effect on improving literacy skills among children aged 5–6 years.

Furthermore, the calculation of the effect size (Cohen's d) yielded a value of 2.86, which falls within the very large effect size category (Menon dkk., 2025). This result indicates that the intervention had a very strong impact on children's literacy development. Empirically, classroom observations showed that children became more enthusiastic, active, and reflective during literacy activities (Amri dkk., 2024). They were not only able to recognize symbols or words within the context of stories but also began connecting them to personal experiences, using new vocabulary appropriately, and expressing their ideas through storytelling and role-play activities (Hajerah dkk., 2024).

The improvement observed aligns with the perspective that deep learning promotes conceptual understanding and personal engagement rather than rote memorization (Fullan dkk., 2017; Hattie, 2008; Kostianen dkk., 2018). By integrating children's daily experiences into story-based literacy activities, the daily activity storybook creates a learning context that is emotionally resonant and cognitively challenging, thereby stimulating multiple domains of literacy - listening, speaking, reading, and emergent writing (Choiriyah dkk., 2023; DeBaryshe, 2023; Hulme & Snowling, 2013). Similar findings were reported by Cipolletti (Cipolletti dkk., 2025) and McNally (McNally dkk., 2024), who found that Shared book reading significantly enhanced preschoolers' vocabulary, inferential talk, and comprehension when guided by reflective questioning and scaffolding techniques (Cipolletti dkk., 2025; McNally dkk., 2024).

The outcomes of this research also support the notion that story-based and experiential literacy activities strengthen the relationship between oral language and later reading proficiency (Hulme & Snowling, 2013; Valcárcel Jiménez dkk., 2024a). Early literacy, as UNESCO (UNESCO, 2022) highlights, forms the foundation for sustainable learning and is a crucial right for all children. Through deep learning, children not only memorize words but internalize meanings, relate them to lived experiences, and use language as a medium for reasoning and self-expression (Fullan dkk., 2019; Mezirow, 2012). This aligns with the transformative learning approach that fosters critical reflection and meaning-making, which are essential in early literacy development (Kaderavek & Justice, 2002; Mezirow, 2012).

Pedagogically, the daily activity storybook promotes dialogic and participatory learning environments where teachers act as mediators of meaning rather than transmitters of knowledge (Danniels & Pyle, 2023; Purdon, 2016; Størksen, Rege, Foldøy, dkk., 2023). Such environments cultivate sustained shared thinking—where teachers and children co-construct understanding through questioning, elaboration, and joint reflection—which has been shown to enhance literacy and cognitive growth (Purdon, 2016; Tompkins dkk., 2013; Wu dkk., 2025). Consistent with this, they observed that shared book reading coupled with guided play significantly improves vocabulary acquisition and inferential comprehension among preschoolers.

Moreover, this study reinforces evidence that the quality of teacher–child interaction during literacy activities determines children's linguistic outcomes. Studies by Wieduwilt (Wieduwilt dkk., 2023), Yang (Yang dkk., 2021), and Houen (Houen dkk., 2022) found that educators who employ open-ended questions, positive feedback, and emotionally supportive scaffolding significantly increase children's expressive and receptive literacy. The daily activity storybook also resonates with the play-based literacy approach, which integrates storytelling, imagination, and role-play into reading experiences (Jay & Knaus, 2018; Sitorus dkk., 2025; Weisberg dkk., 2016). Play contexts provide a natural space for language experimentation, allowing children to negotiate meanings, practice narrative sequences, and construct symbolic representations (Jaggy dkk., 2023; Orr & Geva, 2015; Rüdüsüli dkk., 2024). This integration of play and narrative aligns with the principles of joyful learning emphasized by Fullan (Fullan dkk.,

2018) and the Indonesian Curriculum Merdeka, which calls for holistic and context-based literacy experiences.

From a theoretical standpoint, these results further substantiate Vygotsky's concept of the Zone of Proximal Development (ZPD), where children's literacy skills advance most effectively when supported by adult scaffolding within meaningful social interactions (Chen, 2025; Nicholas, Veresov, & Cripps, 2021). Through guided storytelling, teachers provide linguistic models, encourage metacognitive reflection, and expand children's capacity to use language purposefully (Saodi dkk., 2024; Ståhl dkk., 2025; Veraksa dkk., 2016).

Furthermore, the results contribute to the growing body of literature advocating deep learning in early childhood education as a framework that combines cognitive depth, relational engagement, and reflective inquiry (Cooper dkk., 2024; Fullan dkk., 2017). However, the present findings also contrast with some studies reporting limited effects of storybook interventions when not coupled with reflective facilitation or teacher guidance. These discrepancies highlight that literacy interventions are most effective when teachers employ intentional scaffolding strategies and encourage dialogic reflection, elements central to the deep learning framework (Fullan dkk., 2019).

Practically, the implications of this research are twofold. First, teachers should integrate children's lived experiences into literacy learning through contextual storybooks that promote meaning-making and self-expression. This aligns with the recommendations from UNESCO (UNESCO, 2025) and OECD (OECD, 2018) that early literacy programs must prioritize engagement, cultural relevance, and reflective participation. Second, professional development programs need to equip educators with strategies for sustaining shared thinking, designing inquiry-based storybooks, and fostering emotional safety during literacy activities (Cipolletti dkk., 2025; DeBaryshe, 2023; Størksen, Rege, Solli, dkk., 2023).

In conclusion, the findings of this study reaffirm that daily activity storybook-based deep learning pedagogy offers a powerful and holistic approach to fostering early literacy. It nurtures not only linguistic proficiency but also critical reflection, empathy, and creativity competencies vital for lifelong learning in the 21st century (Fullan dkk., 2018; Størksen, Rege, Solli, dkk., 2023; UNESCO, 2025). By positioning children as active meaning-makers rather than passive recipients, this model fulfills the call for education that is mindful, meaningful, and joyful, a cornerstone of sustainable literacy development in early childhood education.

CONCLUSION

The results of this study show that using the Daily Activity Storybook with a Deep Learning approach can significantly enhance children's literacy skills. Throughout the learning process, children became more engaged, curious, and expressive. They were not just learning to read or recognize letters, but also connecting stories to their own daily experiences. This process allowed them to think more deeply, express their ideas more clearly, and develop a genuine interest in reading and storytelling.

What makes this approach meaningful is the way it brings literacy learning closer to the child's world. By using stories that reflect their everyday activities, learning becomes more personal and enjoyable. Teachers observed that children participated more actively in discussions, asked questions, and even began to create their own narratives. This indicates that literacy development is not just about teaching reading skills, but also about nurturing imagination, empathy, and communication.

In practical terms, this model offers teachers a simple yet powerful way to integrate literacy learning into daily classroom life. The storybook acts as both a learning tool and a bridge for interaction—between teacher and child, and even between school and home. It encourages meaningful dialogue, reflection, and emotional connection, all of which are essential for long-term literacy growth.

Looking ahead, future research could explore how this approach impacts other aspects of development, such as writing ability, digital literacy, or critical thinking. It would also be valuable to examine how family involvement and cultural context shape children's literacy experiences. Overall, this study reinforces that literacy in early childhood is most effective when it is meaningful, joyful, and deeply connected to children's real lives.

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Conflict of Interest

The authors declare no conflict of interest.

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