PRIMARYEDU

Primaryedu: Journal of Elementary Education
Volume 9, Number 2, September 2025

P-ISSN: 2580-9326 | E-ISSN: 2580-7714

The GEMBIRA Program: A Deep Learning-Based Model to Enhance Literacy Skills in Primary Education

Fajar Firmansyah[1*], Fitri Dwi Utami[2], Novi Arianti[3], Intan Fatimah[4], Mahbudin[5], Ryan Dwi Puspita[6]

[1,2,3,4,5,6] Institut Keguruan dan Ilmu Pendidikan Siliwangi.

Article Info

Article history:

Received June 30th, 2025
Revised August 28th, 2025
Accepted September 25th, 2025

Keywords:

Literacy Program
Deep learning
Literacy Ability
Reading and Writing

Abstract

This study aims to examine the effectiveness of the GEMBIRA Program in Grade 5 of elementary school, which integrates a deep learning approach to improve students' reading and writing literacy skills. The program is designed to cultivate meaningful reading habits, reflective writing, and interactive storytelling through the stages of mindful, meaningful, and joyful learning. The research method used is a pre-experimental design with a one-group pretest-posttest approach. The sample consisted of 37 randomly selected students. Data were collected using observation instruments and analyzed both descriptively and inferentially using a t-test and n-gain calculation. The results showed an increase in the average score from 50.25 to 79.14 after the intervention, with an average n-gain score of 0.60, categorized as moderately effective. The t-test showed a significant difference ($p = 0.000 < 0.05$), indicating a statistically significant difference between pretest and posttest scores. These findings demonstrate that the deep learning-based Literasi Gembira Program is effective in holistically improving students' reading and writing literacy skills, and it can serve as an innovative and enjoyable literacy learning model in elementary schools.

Corresponding Author:

Fajar Firmansyah
Institut Keguruan dan Ilmu Pendidikan Siliwangi, Indonesia
Email Author: fajarfirmansyah@student.ikipsiliwangi.ac.id

INTRODUCTION

Literacy has become one of the essential skills that individuals must possess in today's era. In this fast-paced digital age, students need to be equipped with literacy skills from an early age, as they are growing up in an environment saturated with information (Nurmasari et al., 2023). Literacy is not merely about reading and writing, but also about understanding, filtering, and utilizing information for sustainable living and education. Literacy skills are a fundamental aspect of the educational process, playing a crucial role in supporting the success of education (Ahmad et al., 2023). Literacy is one of the essential skills that support learning in the 21st century. It plays a vital role in enhancing creativity and knowledge, enabling individuals living in today's era to

compete with people from all around the world (Casal-Otero et al., 2023). Literacy activities play a crucial role in shaping character-based education, aiming to improve productivity and global competitiveness. The implementation of literacy should begin as early as possible, as literacy is one of the key factors in building a strong and great nation (Shara et al., 2022). "In its simplest sense, literacy can be defined as the ability and skill to read and write. This is supported by Hamzah, as cited in Patriana et al (2021), who states that literacy refers to the ability to read and write, whether in the form of letters, symbols, or numbers, and also includes the ability to understand the meaning or intent behind a given issue. As scientific knowledge continues to develop and learning demands become more profound, the meaning of literacy has significantly broadened. According to Wagner & Hedidar (2023), literacy is a complex and dynamic phenomenon that has evolved from a dichotomous concept (literate/illiterate) into a continuum encompassing the abilities to read, write, and perform numeracy as essential components of human life. There are six dimensions of literacy, namely: reading and writing literacy, numerical literacy, scientific literacy, digital literacy, financial literacy, and cultural and civic literacy (Kemendikbud, 2017). In addition, recent studies have also highlighted the development of other dimensions of literacy, including Artificial Intelligence (AI) literacy. As stated by Yue Yim (2024), AI literacy encompasses a combination of digital literacy skills, data management, computational thinking, and ethical awareness.

Reading literacy refers to the ability to comprehend and interpret the meaning of written texts, while writing literacy is the ability to express ideas and information in a coherent and meaningful written form. These two forms of literacy are closely interconnected and form a crucial foundation for the development of other competencies (Kim et al., 2021). Basic literacy skills, reading, writing, and numeracy are essential abilities that every individual must master, as they are fundamental requirements for further education (Anwas et al., 2022). In practice, strengthening reading and writing literacy in elementary schools must be carried out continuously and integrated into meaningful and enjoyable learning activities (Oktrifianty, 2021). Reading and writing literacy are essential foundational skills that support students' learning success at all levels of education, particularly in elementary school (Zhang et al., 2020). Children who have mastered early literacy skills at the beginning of their elementary education tend to learn to read and write more quickly, thereby becoming better prepared for academic success (Majorano et al., 2021). Early literacy experiences are crucial as the foundation for a child's future academic skills, which is why literacy learning should begin as early as possible (Salminen et al., 2021). The demands of literacy increase in parallel with students' development in elementary school. In the early grades (Grades 1 to 3), instruction focuses on learning to read. However, beginning in Grade 4, students are expected to read to learn. This shift requires students to actively construct meaning during learning, reason through texts, employ various reading strategies, and reflect on what they have read (Mullis & Martin, 2019). Literacy is not merely a technical ability to read and write; it also encompasses comprehension, critical thinking, and the capacity to express ideas in a structured manner. In the context of the 21st century, reading and writing are no longer just technical skills but key tools for knowledge, understanding, and individual empowerment (Setiawan et al., 2024). Literacy equips students to understand various school subjects. By building a strong literacy foundation, students will find it easier to access and comprehend academic content (Schrodt et al., 2024). They will be able to read instructions more accurately, better understand questions, and express their thoughts

more effectively in writing (Tedre et al., 2021). With strong literacy skills, the doors to academic success become more accessible for students. However, various studies have shown that many elementary students still struggle to master basic reading and writing literacy skills, which results in low overall literacy levels among students.

The results of the Programme for International Student Assessment (PISA) indicate that Indonesia is among the countries with low reading proficiency. The 2022 data, published in December 2023, showed that Indonesia's ranking improved by five places compared to 2018; however, the score remains below both the Organisation for Economic Co-operation and Development (OECD) average and the global average. Moreover, Indonesia's reading literacy score in 2022 (359) decreased compared to its 2018 score (379) (OECD, 2023). Research conducted by Husna (2022) suggests that low literacy levels among students are attributed to a lack of innovative teaching methods, minimal integration of technology in the learning process, and limited active student engagement in concept-oriented instruction. This is further supported by Nirmala & Puspita (2025), who argue that the low literacy and numeracy skills observed in the field must be addressed through a paradigm shift in education. This includes changes in the use of learning models and educational facilities employed during instruction. The selection of teaching methods and programs that do not support student engagement also presents a barrier to developing their literacy skills. Consequently, this leads to low student motivation and difficulty in comprehending reading materials deeply. Therefore, more effective teaching approaches are urgently needed to improve the quality of education. In response, various efforts by researchers and the government have focused on fostering a culture of literacy through the development and implementation of diverse literacy programs.

The deep learning approach can be applied and integrated with literacy culture programs to enable students to engage in more meaningful and in-depth learning experiences. In the context of education, deep learning emphasizes conceptual understanding through reflection, social interaction, and the interconnection of ideas (Deng et al., 2024). This approach contrasts with surface learning, which focuses primarily on rote memorization and shallow comprehension. Recent studies have shown that students who learn through deep learning approaches have better memory retention and can connect concepts to real-world experiences, as it prioritizes the principles of mindful learning (Akmal et al., 2025). In the Indonesian context, the implementation of the GEMBIRA Program is also aligned with the *Kurikulum Merdeka*, which emphasizes student-centered, active, and joyful learning. The program's integration of mindful, meaningful, and joyful stages reflects the curriculum's core principles, particularly in fostering reading comprehension, creative writing, collaboration, and critical thinking. By connecting literacy activities to real-life experiences and encouraging creative expression, the GEMBIRA model not only addresses students' basic literacy needs but also supports national curriculum standards aimed at developing holistic, competent, and future-ready learners.

In the context of literacy and numeracy, implementing mindful learning, meaningful learning, and joyful learning is essential to help students build connections with their own experiences, making their understanding of texts and numerical concepts more meaningful (Chen et al., 2023). Based on Practice Engagement Theory (PET), Reder et al., as cited in Grotlüschen et al (2020), argue that literacy training oriented toward active student engagement in meaningful practices can lead to skill development. Furthermore, deep learning also supports exploration-

based learning, discussion, and problem-solving activities that are relevant to real-life contexts. A study conducted by Hastuti & Sufianti (2025), found that deep learning-based instruction increased early-grade students' literacy understanding by up to 89%, as the method is more interactive, experience-based, and emphasizes direct problem-solving. The application of this method in Indonesian language instruction allows students to engage more actively in text comprehension through various strategies such as discussion, concept mapping, literacy games, and the use of interactive technology. These practices contribute significantly to increasing students' motivation and comprehension of the subject matter. Based on these findings, deep learning can be considered an effective approach that can be implemented and integrated into literacy programs.

The GEMBIRA Program (A Deep Learning-Based Model to Enhance Literacy Skills in Primary Education) in this study is implemented using a deep learning approach. The GEMBIRA program is a reading and writing literacy initiative designed to cultivate habits of meaningful reading, reflective writing, and the sharing of inspirational stories. It adopts a deep learning framework, emphasizing deep understanding, connection to real-life experiences, and holistic student development. Through this program, students are not only encouraged to read and write but also to think critically, be creative, collaborate, and show empathy. The GEMBIRA Program aligns with the pillars of deep learning: mindful learning, meaningful learning, and joyful learning. The implementation is divided into three stages. The first stage, mindful (awareness), engages students in slow, focused reading for 15 minutes, followed by teacher-guided reflection. Students then create a 'literacy awareness journal', a daily record of their reading reflections and emotional responses. The second stage, meaningful, involves students connecting their readings to personal experiences, social issues, or real-world contexts. They are encouraged to write stories or poems based on personal, environmental, or local narratives and share their writings in classroom forums, reading corners, or school bulletin boards. The third stage, joyful, allows students to express themselves creatively through various formats such as comics, story videos, vlogs, or illustrations—often using digital tools like Canva. The integration of technology in this program is considered essential to further enhance students' literacy skills. Dorris et al (2024) found that, compared to other media, the use of mobile devices in the classroom significantly improves literacy and numeracy outcomes. Similarly, Hikamudin et al (2023) concluded that students' low literacy levels can be improved through digital media, as it increases motivation and fosters enjoyment in learning activities. The program also invites students to voluntarily share their stories with peers in front of the class or on a designated 'literacy stage'. Grounded in constructivist theory, the deep learning-based GEMBIRA program promotes interactive and participatory learning, where students actively construct their own knowledge through real experiences and independent exploration. As stated by Puspita (2025), constructivism is an educational philosophy that places students at the center of the learning process. In this model, learners do not simply receive knowledge from the teacher; instead, knowledge is actively constructed through experience, social interaction, and reflection. The teacher's role is to act as a facilitator, creating a conducive environment for students to explore ideas, build connections, and develop a deep understanding. Moreover, this program enables teachers to adapt instructional strategies according to students' individual abilities, fostering an inclusive and learner-centered educational experience. This aligns with Vygotsky's (1978) theory of the Zone of Proximal Development (ZPD), as cited in Salsabila

& Megawati (2024), which suggests that learning is most effective when instruction is provided just beyond the learner's current ability but still achievable with the support of peers or teachers. Based on these considerations, the focus of this study is to enhance students' reading and writing literacy comprehension through the GEMBIRA Literacy Program, which is grounded in the principles of the deep learning approach.

Implementing literacy programs that are oriented toward specific learning approaches is crucial for improving students' literacy skills in elementary schools. Several studies have explored the relationship between literacy programs and learning approaches. For instance, Schechter et al., (2025) investigated the Spalding's The Writing Road to Reading (WRTR) literacy program; Lynch & Prins, (2023) examined knowledge frameworks that support the involvement of early childhood and elementary school educators in family literacy and adult literacy programs; Davy Tsz Kit et al (2022) studied an inquiry-based digital storytelling program aimed at enhancing elementary students' AI literacy; and Hastuti & Sufianti (2025) explored how deep learning approaches in Indonesian language instruction can improve early literacy skills. Additionally, Nirmala & Puspita (2025) developed an innovative e-module design using the FIVES model to strengthen literacy and numeracy in elementary education. In contrast, the current study on the GEMBIRA Program adopts a more specific objective: to improve fifth-grade students' reading and writing literacy skills by implementing a literacy program based on the deep learning approach. This program is grounded in three core principles—mindful learning, meaningful learning, and joyful learning—which together aim to foster deeper comprehension, active engagement, and a more holistic learning experience.

METHOD

This study employed a pre-experimental method using a one-group pretest-posttest design (Borg & Gall, 2003). The pre-experimental method was selected because the intervention was conducted on a single group without a control group for comparison. The initial stage of the study involved administering a pretest followed by the treatment, while the posttest was administered after the treatment phase. Data collection was carried out using an observation sheet as the primary instrument. The sampling technique used in this study was random sampling, in which the sample was selected randomly without considering strata within the population (Sumargo, 2020). Since it was not feasible to randomly assign individual students or create new classes, one class was selected randomly. As a result, the sample in this study consisted of fifth-grade students. The one-group pretest-posttest design used in this study is illustrated in Figure 1 below

Group	O_1	**X**	O_2

Figure 1. Research Design

Descriptive quantitative analysis was conducted using SPSS and Microsoft Excel to analyze the data collected from the observation results. To measure the improvement in students' reading and writing literacy skills before and after the implementation of the GEMBIRA literacy program, the significance level and the effectiveness of the intervention were assessed using a paired sample t-test and normalized gain (n-gain), assisted by SPSS version 26.

The data obtained in this study were quantitative in nature and collected through a non-test instrument in the form of an observation sheet, which included indicators of reading and writing literacy skills. This instrument was administered both before and after the treatment. The observation indicators used in the study are outlined in the following assessment rubric.

Table 1. Reading and Writing Literacy Skills Instrument

Aspect	Indicator
Identifying characters and setting	The student can identify the characters in the story and describe the setting where the events take place
Summarizing the story content	The student can deliver the main idea of the story concisely.
Story sequence (narrative order)	The student retells the story in a clear, logical sequence from beginning to middle to end.
Intonation and expression when reading aloud or presenting	The student tells the story with a clear voice and expressive intonation.
Main idea (fishbone diagram – center)	The writing in the center of the fishbone diagram represents the main idea of the story.
Supporting details (fishbone diagram – branches)	The student fills in the fishbone diagram with relevant information according to the story structure: characters, problem, resolution, and moral.
Neatness and legibility of writing	The student's writing is neat, well-organized, and easy to read.

The stages of the GEMBIRA Program are adapted using the deep learning approach. The following are the implementation stages.

Table 2. Stages of the GEMBIRA Program Based on a Deep Learning Approach

Learning Stage	Implementation in the GEMBIRA Literacy Program	Teacher's Guiding Activities
Mindful learning	Students are invited to read slowly and attentively for 15 minutes. The teacher guides reflection with questions such as: "What does this story mean to you?" and "How did you feel while reading?" Students create a literacy awareness journal, a daily log containing reflections on their reading and the emotions that emerged..	-Provides reading materials appropriate to students' levels. -Guides students with reflective questions (e.g., "What does this story mean to you?"). -Demonstrates how to write a simple reflection journal.
Meaningful learning	After reading, students are encouraged to connect the content with their personal experiences, social issues, or real-life contexts. Students may also write stories or poems based on personal experiences, their environment, or local narratives.	-Facilitates class discussions to help students link readings with real-life experiences. -Provides step-by-step guidance in writing stories or poems. -Supports students during presentations and gives constructive feedback.

	Students share their written work in class forums, reading corners, or on school bulletin boards.	
Joyful learning	During writing activities, students express themselves in various formats such as comics, story videos, vlogs, or illustrations, including those created using Canva. Students may also voluntarily share their stories with peers, either in front of the class or on the school's literacy stage	-Models the use of creative media (e.g., Canva, simple comics). -Guides students through the process of producing their work. -Motivates and supports students when sharing their work in front of peers.

RESULT AND DISCUSSION

Result

The data were analyzed using descriptive statistics, and the average scores of students' reading and writing literacy skills before and after the implementation of the GEMBIRA Program were obtained. The results are illustrated in the figure below.

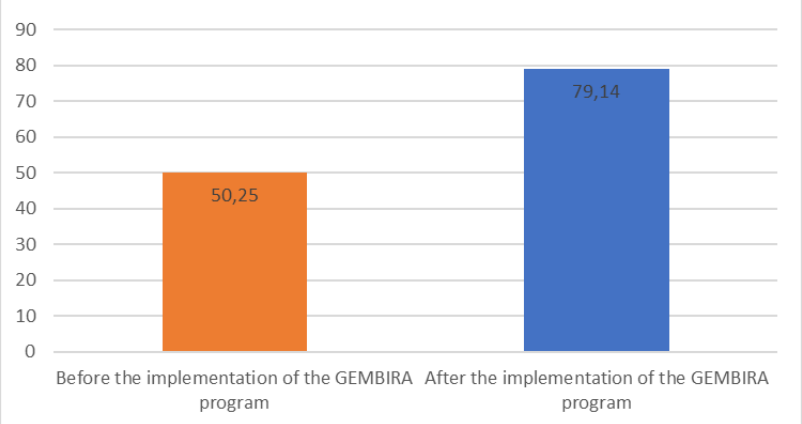

Figure 2. Average Observation Scores of Students' Reading and Writing Literacy Skills Before and After Learning with the GEMBIRA Literacy Program

Figure 2 shows an increase in students' reading and writing literacy skills before and after the implementation of the GEMBIRA literacy program. Before the program, the average score of students' literacy skills was 50.25, while after the program, the average score increased to 79.14, indicating an improvement of 28.89%. This suggests a clear difference in students' literacy skills before and after the implementation of the GEMBIRA program, meaning that students' reading and writing literacy skills improved. To determine whether this improvement is statistically significant, a paired sample t-test was conducted using SPSS version 26 at a significance level of $\alpha = 0.05$. The results of the analysis are presented in the table below.

Table 3. Paired Sample T-Test Result

	N	Mean	Deviation Standard	Sig (2-Tailed)
Results Before the Implementation of the GEMBIRA Literacy Program	37	50,25	9,41	0.000
Results After the Implementation of the GEMBIRA Literacy Program	37	79,14	10,12	

Table 3 shows that the significance value (2-tailed) is 0.000, which is lower than $\alpha = 0.05$. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. This indicates that there is a statistically significant difference in students' reading and writing literacy skills before and after the implementation of the GEMBIRA literacy program. The mean observation scores demonstrate that students' literacy skills after participating in the GEMBIRA program are higher than their skills before the program or under regular instruction.

These findings suggest that the GEMBIRA Program effectively enhances students' reading and writing literacy. The average scores for each indicator item are presented in Figure 2

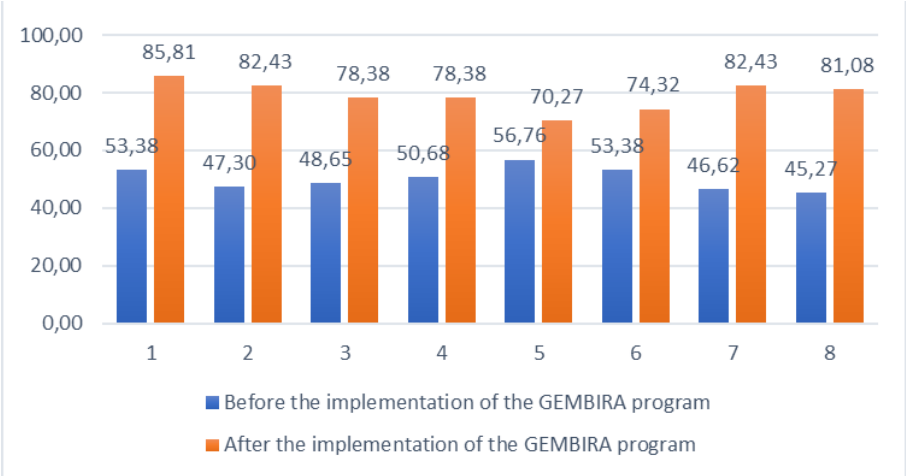

Figure 3. Average Scores per Indicator Before and After the Implementation of the GEMBIRA Literacy Program

Figure 2 illustrates an increase in students' reading and writing literacy skills across all indicator aspects before and after the implementation of the GEMBIRA literacy program. Among the eight indicators of reading and writing literacy, none showed a decline; each one demonstrated improvement. Furthermore, the level of effectiveness of this improvement was determined using the normalized gain (n-gain) analysis, calculated from students' pretest and posttest scores. The results of the n-gain analysis are presented in Table 5 below

Table 4. N-Gain Result

Result	N-Gain	Category	Effectiveness Level
Pretest-posttest	0,60	Medium	Moderately Effective

Based on Table 4, it can be interpreted that there was an improvement in students' reading and writing literacy skills from the pretest to the posttest, or before and after the implementation of the GEMBIRA literacy program. The n-gain score obtained was 0.60, which falls into the medium category, indicating a moderately effective level of improvement

Discussion

Reading and writing literacy skills served as the dependent variable in this study, while the literacy program and deep learning approach functioned as the independent variables. The GEMBIRA Program was designed to promote improved reading and writing literacy among students, in line with its intended objectives. This finding is consistent with the study by Islami & Ferdianto (2024), which found that the implementation of literacy programs in schools has a significant positive impact on enhancing students' interest in reading and writing. Similarly,

Susianti et al (2021) concluded that the School Literacy Movement program contributes to the development of various student competencies, including reading, writing, and numeracy, even to more advanced and independent levels. In line with this, Aswasulasikin (2022) emphasized that the school literacy movement plays a vital role in improving students' motivation and reading interest. However, the implementation of such programs must be carried out consistently and continuously to effectively foster student motivation. Unlike these existing initiatives, the GEMBIRA Program is an original model developed by the authors, designed specifically to integrate deep learning principles—mindful, meaningful, and joyful learning—into elementary literacy instruction.

The GEMBIRA Program also adopts a deep learning approach that emphasizes mindful learning, meaningful learning, and joyful learning in its implementation. This approach is intended to support the development of students' deeper reading and writing literacy skills. In the context of mindful learning, the program promotes student engagement in activities that cultivate awareness throughout the literacy process, helping students stay more focused during the sessions. As stated by Dewi & Fauziati (2021), learning that is connected to and reflected upon through students' conscious experiences enables them to better understand new concepts.

For meaningful learning, students are encouraged to relate the reading materials to their real-life experiences, making their learning process more personally relevant. This is supported by Aryanto et al (2025), who assert that meaningful learning occurs when students can connect new knowledge with their existing cognitive structures.

In the context of joyful learning, students are given the freedom to express their writing through a variety of media of their own choice—such as comics, story videos, vlogs, or illustrations, including those created using mobile applications. Students also have the opportunity to voluntarily share their reading reflections and stories with peers, either in front of the class or on the school's literacy stage. In line with this, Odounfa et al (2024) argue that digital-based educational games significantly enhance student engagement and comprehension of literacy and numeracy concepts.

The GEMBIRA literacy program, implemented through a deep learning approach, can be considered moderately effective in improving students' reading and writing literacy skills. This is evident from the significant difference in students' average scores before and after the application of the program. The improvement in literacy skills was observed following the intervention. These findings align with the results of Hastuti & Sufianti (2025), who confirmed that the application of deep learning in instruction has a positive impact on enhancing students' literacy. The significant improvement in reading skills and learning motivation indicates that this approach is effective in creating a more interactive and meaningful learning environment. Similarly, the study conducted by Johansz (2025) supports this outcome, demonstrating the effectiveness of deep learning in literacy programs and its significant impact on students' reading literacy skills.

CONCLUSION

This study demonstrates that the GEMBIRA Literacy Program, based on a deep learning approach, significantly enhances the reading and writing literacy skills of fifth-grade elementary students. Based on the results of descriptive statistical analysis, the average score increased from 50.25 before the intervention to 79.14 after the program's implementation, representing a 28.89%

improvement. The paired t-test revealed a statistically significant difference ($p = 0.000 < 0.05$), and the calculated n-gain score was 0.60, which falls within the medium category, indicating a moderately effective outcome.

The application of the deep learning approach through the stages of mindful, meaningful, and joyful learning within the GEMBIRA Program fostered a learning process that was reflective, relevant to real-life experiences, and enjoyable for students. Through meaningful reading, reflective writing, and storytelling activities, students not only developed technical literacy skills but also enhanced their critical thinking, collaboration, and self-expression.

In conclusion, the GEMBIRA Program, framed within the deep learning approach, has proven to be an effective and relevant strategy for improving the quality of reading and writing literacy at the elementary school level. It may serve as an innovative model for literacy instruction that is contextual, interactive, and focused on the holistic development of students' potential.

REFERENCES

Ahmad, A., Mustafa, B., Sunendar, D., & Septian, R. (2023). The Effect Of The Cooperative Integrated Reading And Composition Model Assisted Video Media On Reading Comprehension And Critical Thinking. *PrimaryEdu : Journal of Elementary Education*, *7*(2), 186–198.

Akmal, A. N., Maelasari, N., Ilmu, T., & Islam, P. (2025). *Pemahaman Deep Learning dalam Pendidikan : Analisis Literatur melalui Metode Systematic Literature Review (SLR)*. *8*.

Anwas, E. O. M., Afriansyah, A., Iftitah, K. N., Firdaus, W., Sugiarti, Y., Sopandi, E., & Hediana, D. (2022). Students' Literacy Skills and Quality of Textbooks in Indonesian Elementary Schools. *International Journal of Language Education*, *6*(3), 233–244. https://doi.org/10.26858/ijole.v6i3.32756

Aryanto, S., Meliyanti, Amelia, D., Maharbid, A., Gumala, Y., & Gildore, P. (2025). *Pembelajaran Literasi Dan Numerasi Melalui Deep Learning : Pendekatan Transformasional*. 49–57.

Casal-Otero, L., Catala, A., Fernández-Morante, C., Taboada, M., Cebreiro, B., & Barro, S. (2023). AI literacy in K-12: a systematic literature review. *International Journal of STEM Education*, *10*(1). https://doi.org/10.1186/s40594-023-00418-7

Chen, X., Chen, Z., Lin, L., Yan, H., Huang, Z., & Huang, Z. (2023). A Deep Learning-Based National Digital Literacy Assessment Framework Utilizing Mobile Big Data and Survey Data. *IEEE Access*, *11*(September), 108658–108679. https://doi.org/10.1109/ACCESS.2023.3321831

Davy Tsz Kit, N. G., Luo, W., Chan, H. M. Y., & Chu, S. K. W. (2022). Using digital story writing as a pedagogy to develop AI literacy among primary students. *Computers and Education: Artificial Intelligence*, *3*(September), 100054. https://doi.org/10.1016/j.caeai.2022.100054

Deng, J., Huang, X., & Ren, X. (2024). A multidimensional analysis of self-esteem and individualism: A deep learning-based model for predicting elementary school students' academic performance. *Measurement: Sensors*, *33*(March), 101147. https://doi.org/10.1016/j.measen.2024.101147

Dewi, L., & Fauziati, E. (2021). Pembelajaran Tematik di Sekolah Dasar dalam Pandangan Teori Konstruktivisme Vygotsky. *Jurnal Papeda: Jurnal Publikasi Pendidikan Dasar*, *3*(2), 163–174. https://doi.org/10.36232/jurnalpendidikandasar.v3i2.1207

Dorris, C., Winter, K., O'Hare, L., & Lwoga, E. T. (2024). A systematic review of mobile device use in the primary school classroom and impact on pupil literacy and numeracy attainment: A systematic review. *Campbell Systematic Reviews*, *20*(2). https://doi.org/10.1002/cl2.1417

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational Research: An Introduction*. Allyn and Bacon. https://books.google.co.id/books?id=_rRhQgAACAAJ

Grotlüschen, A., Desjardins, R., & Liu, H. (2020). Literacy and numeracy: Global and comparative perspectives. *International Review of Education*, *66*(2–3), 127–137. https://doi.org/10.1007/s11159-020-09854-x

Hastuti, F. E., & Sufianti, V. A. (2025). *Meningkatkan Kemampuan Literasi Dini bagi Peserta Didik Kelas 1A MIN 2 Metro melalui Pendekatan Deep Learning dalam Pembelajaran Bahasa Indonesia*. *5*, 899–902.

Hikamudin, E., Riyadi, A. R., Aryanti, Peniasiani, D., Nuryani, P., & Gofur, R. (2023). Improving Elementary School Students' Understanding of Literacy and Numeracy Through Digital Applications. *MIMBAR PGSD Undiksha*, *11*(3), 462–467. https://doi.org/10.23887/jjpgsd.v11i3.64018

Husna, R. A. (2022). Peran Gerakan Literasi Sekolah Dalam Meningkatkan Motivasi Dan Minat Baca Siswa. *LEARNING : Jurnal Inovasi Penelitian Pendidikan Dan Pembelajaran*, *2*(3), 201–208. https://doi.org/10.51878/learning.v2i3.1523

Islami, R. M., & Ferdianto, F. (2024). Gerakan Literasi Sekolah Meningkatkan Minat Membaca Siswa Kelas 4 Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, *6*(2), 1477–1483.

Johansz, D. (2025). Pengaruh Penerapan Deep Learning Terhadap Kemampuan Literasi Membaca Siswa Sd Negeri Tiakur. *Jurnal Review Pendidikan Dan Pengajaran*, *8*(2), 4555–4560.

Kemdikbud. (2017). Panduan Gerakan Literasi Nasional. *Panduan Gerakan Literasi Nasional*, 50. https://gln.kemdikbud.go.id/glnsite/wp-content/uploads/2017/08/panduan-gln.pdf

Kim, J. S., Burkhauser, M. A., Mesite, L. M., Asher, C. A., Relyea, J. E., Fitzgerald, J., & Elmore, J. (2021). Improving reading comprehension, science domain knowledge, and reading engagement through a first-grade content literacy intervention. *Journal of Educational Psychology*, *113*(1), 3–26. https://doi.org/10.1037/edu0000465

Lynch, J., & Prins, E. (2023). Knowledge to Support Early Educators and Elementary School Teachers' Engagement in Family Literacy and Family Literacy Programs. *International Literacy Association*, *76*(5), 618–626. https://doi.org/10.1002/trtr.2187

Majorano, M., Bastianello, T., Bodea-Hategan, C., Fantuzzi, P., Fontana, G., Hoste, E., Lombardi, M., Standaert, A., Talas, D., Trifu, R., Vescogni, L., & Persici, V. (2021). Early Literacy Skills and Later Reading and Writing Performance Across Countries: The Effects of Orthographic Consistency and Preschool Curriculum. *Child and Youth Care Forum*, *50*(6),

1063–1085. https://doi.org/10.1007/s10566-021-09611-7

Mullis, I. V. S., & Martin, M. O. (2019). Assessment framework. In *OECD Review of Higher Education, Research and Innovation: Portugal*. https://doi.org/10.1787/ef37cecd-en

Nirmala, S. D., & Puspita, R. D. (2025). *Innovative E-Module Design Using the FIVES Model : Strengthening Literacy and Numeracy in Elementary Schools*. *17*, 1504–1518. https://doi.org/10.35445/alishlah.v17i1.6756

Nurmasari, L., Budiyono, Nurkamto, J., & Ramli, M. (2023). Mathematical Literacy in Primary Schools: A Systematic Literature Review. *AIP Conference Proceedings*, *2540*(January). https://doi.org/10.1063/5.0105855

Odounfa, M. G. F., Gbemavo, C. D. S. J., Tahi, S. P. G., & Glèlè Kakaï, R. L. (2024). Deep learning methods for enhanced stress and pest management in market garden crops: A comprehensive analysis. *Smart Agricultural Technology*, *9*(July), 100521. https://doi.org/10.1016/j.atech.2024.100521

OECD. (2023). Pisa 2022 Results. In *Factsheets: Vol. I*. https://www.oecd-ilibrary.org/education/pisa-2022-results-volume-i_53f23881-en%0Ahttps://www.oecd.org/publication/pisa-2022-results/country-notes/germany-1a2cf137/

Oktrifianty, E. (2021). *Kemampuan Menulis Narasi di Sekolah Dasar (Melalui Regulasi Diri, Kecemasan dan Kemampuan Membaca Pemahaman)*. CV Jejak (Jejak Publisher). https://books.google.co.id/books?id=tPQ4EAAAQBAJ

Puspita, R. D. (2025). *Penerapan Teori Konstruktivisme dalam Pembelajaran Pendidikan Pancasila di Kelas IV SDN 18 Dodu*.

Salminen, J., Khanolainen, D., Koponen, T., Torppa, M., & Lerkkanen, M. K. (2021). Development of Numeracy and Literacy Skills in Early Childhood—A Longitudinal Study on the Roles of Home Environment and Familial Risk for Reading and Math Difficulties. *Frontiers in Education*, *6*(October). https://doi.org/10.3389/feduc.2021.725337

Salsabila, S., & Megawati, F. (2024). Penguatan Kemampuan Literasi Bahasa Inggris Melalui Media Pembelajaran untuk Meningkatkan Motivasi Belajar bagi Siswa Sekolah Dasar. *Jurnal Ilmiah Kampus Mengajar*, *4*, 60–71. https://doi.org/10.56972/jikm.v4i1.145

Schechter, R. L., Gross, R., & Janakiefski, L. (2025). Spalding ' s The Writing Road to Reading. *LXD RESEARCH*.

Schrodt, K., FitzPatrick, E., Lee, S., McKeown, D., McColloch, A., & Evert, K. (2024). The Effects of Invented Spelling Instruction on Literacy Achievement and Writing Motivation. *Education Sciences*, *14*(9). https://doi.org/10.3390/educsci14091020

Setiawan, B., Muharani, I. N., Arifin, M. Z., & Ardianto, D. (2024). *Problematic Numerical Literacy in Elementary Schools : Systematic Literature Review*. *8*(1), 55–65.

Shara, A. M., Kisno, K., & Hasibuan, M. T. (2022). Reading and writing literacy in junior high school, Pematangsiantar. *International Journal of Curriculum and Instruction*, *14*(2), 1457–1470. https://orcid.org/0000-0000-0000-0000

Sumargo, B. (2020). *Teknik Sampling*. UNJ PRESS. https://books.google.co.id/books?id=FuUKEAAAQBAJ

Susianti, T. S., Salimi, M., Arsy, R. A., & Hidayah, R. (2021). Dampak Implementasi Gerakan Literasi Sekolah pada Sikap Peserta Didik di SD N 1 Pandowan. *Edukasi: Jurnal Penelitian Dan Artikel Pendidikan*, *13*(1), 55–68. https://doi.org/10.31603/edukasi.v13i1.5051

Tedre, M., Toivonen, T., Kahila, J., Vartiainen, H., Valtonen, T., Jormanainen, I., & Pears, A. (2021). *Teaching Machine Learning in K-12 Computing Education: Potential and Pitfalls*. http://arxiv.org/abs/2106.11034

Wagner, D. A., & Hedidar, W. (2023). Literacy and international development. In R. J. Tierney, F. Rizvi, & K. Ercikan (Eds.), *International Encyclopedia of Education (Fourth Edition)* (Fourth Edi, pp. 717–722). Elsevier. https://doi.org/https://doi.org/10.1016/B978-0-12-818630-5.07110-4

Wulandari, M. D., Patriana, W. D., & Sutama. (2021). Pengelolaan Pembelajaran Berorientasi Literasi Numerasi di Sekolah Dasar dalam Kegiatan Kurikuler dan Ekstrakurikuler. *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar*, *9*(2), 116–131.

Yue Yim, I. H. (2024). A critical review of teaching and learning artificial intelligence (AI) literacy: Developing an intelligence-based AI literacy framework for primary school education. *Computers and Education: Artificial Intelligence*, *7*(September), 100319. https://doi.org/10.1016/j.caeai.2024.100319

Zhang, S. Z., Inoue, T., Shu, H., & Georgiou, G. K. (2020). How does the home literacy environment influence reading comprehension in Chinese? Evidence from a 3-year longitudinal study. *Reading and Writing*, *33*(7), 1745–1767. https://doi.org/10.1007/s11145-019-09991-2