

DEVELOPMENT OF AUGMENTED REALITY FLASHCARD MEDIA TO IMPROVE LITERACY AND SHORT STORY WRITING ABILITY OF ELEMENTARY SCHOOL STUDENTS

Latifah Dwi Utami^{1a}, Gunawan^{2b*}

¹Magister Pendidikan Dasar, Pascasarjana, Universitas Muhammadiyah Purwokerto

²Magister Pendidikan Matematika, Pascasarjana, Universitas Muhammadiyah Purwokerto

^aE-mail: latifahdwiutami0857@gmail.com

^bE-mail: gun.oge@gmail.com

(*) Corresponding Author

gun.oge@gmail.com

ARTICLE HISTORY

Received : 20-03-2026

Revised : 07-04-2026

Accepted : 25-05-2026

KEYWORDS

*Augmented reality
flashcards;
literacy skills;
short story writing skills;*

ABSTRACT

This study aims to develop Augmented Reality Flashcard media that meets the level of feasibility, practicality, and effectiveness in improving reading literacy skills and short story writing skills in elementary school students. The method used is research and development (R&D) with a 4D model (define, design, develop, and disseminate). The research subjects are grade II students of UMP elementary school. Quantitative research involves an experimental group and a control group. Data collection techniques consist of tests, questionnaires, interviews, observations, and documentation. Data analysis applied statistical normality, homogeneity, and independent sample test. The validation results showed that the media produced was considered feasible and practical to be applied in the learning process. The effectiveness test through the t-test obtained a significance value of 0.000 (<0.05) on literacy ability to read and write short stories, indicating a significant difference between the two groups. The results of the evaluation showed that the average score of students in the experimental class was higher than in the control class. The use of Augmented Reality Flashcards is effective in improving students' literacy skills and short story writing skills. This research contributes to presenting Augmented Reality Flashcard media that is proven to be feasible, practical, and effective, as well as expanding the use of AR technology in improving literacy skills in reading and writing short stories in elementary school students.

This is an open access article under the CC-BY-SA license.



INTRODUCTION

According to the results of the 2022 International Student Assessment Program (PISA) organized by the Organisation for Economic Co-operation and Development (OECD), Indonesia is ranked 70th out of 80 countries that are participants in reading literacy. The score obtained is 359 points, this achievement is the worst since

Indonesia first participated in the survey in 2000. More in-depth, literacy competencies involve the ability to explore, assess, utilize, and produce information efficiently and responsibly. The modern context applies literacy as a skill that includes language skills, numeracy, image interpretation, computer technology, and various initiatives to acquire knowledge (Ramdhayani, 2023).

One of the activities that is considered effective in improving literacy skills is the use of digital technology. Now children are very familiar with devices in their daily routines. In line with research conducted by Khusna and Yusuf (2026) shows that the use of mobile devices in learning has an important role in improving the quality of learning processes and outcomes. Gadget-based learning allows for the creation of a more flexible, independent, and interactive learning process. Digital media provides an interesting and interactive learning experience that can be tailored to individual needs. This technology also opens up opportunities for students to access a variety of accurate and up-to-date learning materials. Popular forms of media currently in use include e-books, educational videos, and PowerPoint presentations. Teachers also have access to various applications to support classroom learning, such as Canva, Powtoon, Prezi, Kinemaster, and Assemblr Edu (Kuntari, 2023).

One example of digital media that can be used to improve students' literacy skills is the Augmented Reality Flashcard (FAR). This card serves as a practice tool for students in early reading, which is made to be easier to remember and able to attract their attention, interest, and motivation during the learning process (Hardiyanti et al., 2024). FAR cards excel as a learning medium because of their practicality, flexibility, and simplicity. These cards can be combined with a variety of learning materials, ranging from alphabets and numbers to illustrations and practice questions. Meanwhile, Augmented Reality (AR) technology provides a more immersive and interactive learning experience. AR allows students to observe three-dimensional objects that appear as if they are in the real world. The integration of flashcards and AR has the potential to produce learning tools that attract student engagement and are efficient in improving literacy skills. Through the integration of technologies such as Augmented Reality (AR), Virtual Reality (VR), and adaptive mobile learning systems, students can obtain a more contextual, engaging, and meaningful learning experience, thereby encouraging a significant increase in learning motivation, concept understanding, and academic achievement compared to conventional learning (Dorris et al., 2024).

Research conducted by Sharmin and Chow (2020) revealed that the application of mobile device-based Augmented Reality (AR) has proven to be effective in improving students' psychomotor skills. Through the development of FAR media, students can scan images using mobile phone cameras to display three-dimensional digital models. The presence of this media provides a more interactive and immersive learning experience, thus attracting attention and strengthening student involvement in the learning process. Therefore, the integration of AR technology in learning activities not only deepens conceptual understanding but also plays an important role in honing psychomotor skills in real life. Lower grade students need more attention because they are still weak in concentration (Helsa & Kenedi, 2019). Augmented Reality (AR) has a big role in learning, as it is able to provide a more interactive and engaging learning experience. Through visuals, audio cues, and simulations projected into the real environment, AR can increase students' interest and engagement and help understand concepts more clearly. This technology is also able to create an immersive learning experience that makes learning more meaningful and effective (Al-ansi et al., 2023).

Various studies have shown that flashcard media and Augmented Reality (AR) technology have the potential to improve basic literacy, especially in vocabulary mastery and early reading skills. However, most studies still examine literacy skills separately and have not integrated reading and writing skills at the same time. In addition, the use of AR flashcards at the elementary school level tends to be focused on increasing learning motivation or reading skills, while research examining its effect on writing skills, especially in writing short stories, is still relatively limited. On the other hand, the development of AR-based media through systematic approaches such as R&D models and thorough testing of feasibility, practicality, and effectiveness aspects through experimental design has also not been widely done. Therefore, research is needed that is able to fill this gap by developing Augmented Reality Flashcard (FAR) media that integrates reading and writing skills in

elementary school students.

In line with this, the level of student involvement plays an important role in determining concentration during the learning process. However, initial interviews with low-grade teachers revealed that the current learning media has not been able to stimulate student involvement optimally. This results in students who actually have high engagement potential, seem less enthusiastic and not fully involved in learning in the classroom. Active participation plays an important role in optimizing the development of literacy and writing skills. Based on this background, the research aims to produce Augmented Reality Flashcard media that meets valid, practical, and effective aspects to improve the literacy and writing ability of elementary school students. This research is expected to make a real contribution to the world of education, especially in innovation in the development of learning media that suits the learning needs of the digital era.

METHOD

Research is carried out by applying the research and development method (Research and Development). Research and development is a method used to develop products and validate products. This research develops Augmented Reality Flashcard (FAR) media to improve the literacy skills and short story writing skills of elementary school students. In developing Augmented Reality Flashcard media, implementing the 4D development model is one of the most widely used learning tool development models because it has a systematic, logical, and easy to apply structure to various learning contexts. The 4D model consists of four main stages, namely define, design, develop, and disseminate, each of which has a specific function in the development process. The steps in the research and development process are illustrated in the following figure 1:



Figure 1. Research Design for 4D Model Development

The research was carried out in the even semester of the 2025/2026 school year in Kembaran District, Banyumas Regency. The research subjects were elementary school grade II students, with a sample of 20 students as the experimental class and 20 students as the control class. The experimental class used Flashcard Augmented Reality media in learning Indonesian, while the control class used conventional media (powerpoint). To test the effectiveness of the product, this study used a true experimental experimental design in the form of a posttest-only control group design.

Data collection in this study was carried out through test and non-test techniques. The test instruments were in the form of literacy and short story writing skills tests, while non-test instruments included teacher and student response questionnaires, observation sheets, interview guidelines, and documentation. The analysis of media validity was obtained from the results of the experts' assessments. Practical analysis was obtained from the results of the teacher's response questionnaire and in a limited trial. Meanwhile, the analysis of media effectiveness was carried out statistically with the help of IBM SPSS Statistics version 25 software. Before the hypothesis test was carried out, a prerequisite test was first carried out in the form of a normality test and a

homogeneity test using the Levene test. Furthermore, a hypothesis test was carried out to determine the difference in literacy ability and short story writing skills between the experimental class and the control class. The test differed on average compared to the independent sample t-test. The results of this analysis were used to determine whether or not the use of Augmented Reality Flashcard media had a significant influence on the improvement of literacy skills and short story writing skills of elementary school students.

RESULT AND DISCUSSION RESULT

This section contains the results obtained from the research. The explanation of the research results adjusts to the stages of 4D development starting from define, design, develop, and disseminate. The following are the results of the presentation of each stage of development.

Definition Stage

Based on the results of interviews and observations, the initial findings show that learning is still dominated by conventional methods with the use of textbooks and printed images, and has not made optimal use of technology-based media. As a result, students have difficulty understanding story elements such as characters, plots, and settings, which has an impact on the low ability to compose stories in a coherent and meaningful way. Judging from the learning conditions, the material presented is still textual without adequate visual support, so students are less interested and easily feel bored. This has an impact on the low involvement of students during the learning process and the achievement of reading and writing literacy skills is not optimal. Students tend to only be able to understand explicit information and are not able to interpret the content of the text thoroughly. In addition, the ability to develop ideas and compose storylines is still relatively low due to the lack of visual and interactive learning stimulus.

In terms of student characteristics, grade II elementary school students are at a concrete operational stage, so they need learning media that is able to present abstract concepts in a more real and easy-to-understand form. The use of visual and digital media has been proven to be able to increase attention and activeness because students are more interested in learning that involves images, illustrations, and direct interaction. Therefore, media that is able to combine visual and technological elements is very important to support the learning process in accordance with cognitive development. In terms of development needs, teachers and students expect learning media that is innovative, interactive, and able to help visualize ideas and story elements in a concrete way. Augmented Reality Flashcard Media is seen as the right solution because it can integrate visual cards with AR technology that displays objects in a more real and interactive way. This media not only helps in understanding the content of reading, but also acts as a scaffolding in developing story ideas. Thus, the results of the needs analysis at this define stage are a strong basis for the development of Augmented Reality Flashcard media as an effort to improve students' literacy skills and short story writing skills.

Design Stage

This section will explain the initial design of the Augmented Reality Flashcard media. Table 1 shows the initial design of the Augmented Reality Flashcard media that will be used in learning activities.

Table 1. Augmented Reality Flashcard Design

No	Display Media	Description
1		Cover <i>Flashcard Augmented Reality</i>



2 Instructions for use, learning outcomes, and learning objectives

3 Learner worksheets

Animation design

Source: Design Draft, 2026.

Develop Stage

This section first presents the results of the Flashcard Augmented Reality media validation test which includes media expert validators and material experts. Table 2 shows the results of media and material validation.

Table 2. Results of Augmented Reality Flashcard

Validation Test No	Category	Aspect
Media Expert		
1	Display Design	Valid
2	Ease of Use	Valid
3	Interactivity	Valid
4	Media Integration	Valid Material Expert
1	Content Eligibility	Valid
2	Language Qualifications	Valid
3	Presentation Eligibility	Valid
4	Visual Communication	Valid Source: Validation Test, 2026

Based on table 2, the results of the validation of media experts show that all aspects have obtained a valid category assessment, which indicates that the media has met the feasibility aspects in terms of design, ease of use, interactivity, and media integration. The media is considered to have an attractive appearance, responsive navigation, and is able to encourage active student involvement. All aspects of the validation of the subject matter experts received a valid assessment, which shows that the media has met the feasibility aspects of content, language, presentation, and visual communication. The material is assessed in accordance with the learning objectives and characteristics of the students and is presented systematically and easily understood. In addition, the integration between text, illustrations, and Augmented Reality technology is considered to be able to clarify concepts and support the achievement of short story writing competencies. Thus, Flashcard Augmented Reality media is said to meet the valid category.

The next presentation is about the practicality test shown by the results of the teacher's and students' responses in a limited way. Table 3 explains the results of the teacher's and students' responses.

Table 3. Results of Recapitulation of Teacher and Student Responses

No	Aspect	Score (%)
Teacher's Response		
1	Display Quality	89
2	Ease of Use	100
3	Material Suitability	
4	Benefits of Learning	78
5	Attraction	78
Student Response		
1	Media Attractiveness	83,33
2	Ease of Use	90
3	Material Understanding	94
4	Learning Motivation	88,33
5	Engagement	88,89

Source: Respons Test, 2026

Based on table 3, teachers' responses to Augmented Reality Flashcard media were in the practical category with an average percentage of 86.8%. The ease of use aspect obtained the highest score of 100%, which shows that the media is very easy to operate in learning. The aspect of display quality and attractiveness also received a high score, which is 89%, which indicates that the media is quite visually appealing. Meanwhile, the aspect of material suitability and learning benefits received the lowest score of 78%, but is still in the good category. Student response to the media is in the practical category with an average percentage of 88.91%. The aspect of understanding the material received the highest score of 94.00%, which shows that the media is effective in helping students understand the material. The aspects of ease of use, learning motivation, and involvement also showed high scores. Meanwhile, the aspect of media attractiveness received the lowest score of 83.33%, but it is still in the good category. This shows that the media has been able to attract students' attention as well as increase active participation in learning. Thus, Flashcard Augmented Reality media meets the practical aspects used by students in learning.

Next, an effectiveness test of Flashcard Augmented Reality media will be presented to improve students' literacy skills and short story writing skills. Previously, a prerequisite test was carried out, namely normality and homogeneity.

Table 4. Normality Test Results

Literacy Ability
 Short Stories Shapiro-Wilk

Ability to Write
 Shapiro-Wilk

	Statistic	df	sig.	Statistic	df	sig.
Exsperiment	0,908	20	0,058	0,909	20	0,061
Control	0,925	20	0,121	0,929	20	0,147

Source: SPSS Output, 2026

Based on table 4 of the results of the normality test of literacy data conducted using the Shapiro-Wilk test, it is known that the significance value in the control class is 0.121. Meanwhile, the results of the normality test in the experimental class show a significance value of 0.058. Because the significance value is also above 0.05, the data in the experimental class and the control class are each declared to be normally distributed. The results of the normality test of the ability to write short stories with the Shapiro-Wilk test show that the significance values in the experimental and control classes are 0.061 and 0.147, respectively, meaning more than 0.05. Thus, the two data on literacy ability and the ability to write short stories each reached the normal category. Next, the results of the homogeneity test will be presented.

Table 5. Homogeneity Test Results

Variables	Levene Statistic	df1	df2	Sig.
Literacy Ability	1,759	3	15	0,198
Ability to Write Short Stories	0,978	1	38	0,329

Source: SPSS Output, 2026

Based on table 5 of the homogeneity test results using the Levene test, a significance value of 0.329 was obtained for the ability to write short stories while the significance value for literacy ability was 0.198. The value of both was above 0.05, so it can be concluded that the value of short story writing ability and literacy ability of students in the control and experimental classes using Flashcard Augmented Reality media was the same or homogeneous. Furthermore, the next test was an independent sample t test to test the effectiveness of Flashcard Augmented Reality media to improve reading ability and short story writing ability.

Table 6. Independent Sample T Test Results

Value	Aspects	t	df	Sig.(2-tailed)
Ability to Write Short Stories	Equal variances assumed	4.033	38	0,000
	Equal variances not assumed	4.033	36.333	0,000
Literacy Ability	Equal variances assumed	4,789	38	0,000
	Equal variances not assumed	4.789	37.845	0,000

Source: SPSS Output, 2026

Based on table 6 of the results of the hypothesis test of students' literacy ability using the Independent Samples t-test, a significance value (Sig. 2-tailed) of 0.000 was obtained, which was smaller than 0.05. Thus, the null hypothesis (H0) was rejected and the alternative hypothesis (H1) was accepted, meaning that there was a significant difference in students' literacy ability between the control class and the experimental class. The mean difference of 17,500 showed that the literacy ability of students in the experimental class was higher than that of the control class. This was strengthened by the 95% confidence interval value in the range of 10,102 to 24,898, which showed that the difference was consistent and convincing. Based on these results, it can be concluded that the use of Flashcard Augmented Reality media has a significant influence on improving students' literacy skills. This media has been proven to be effective in helping students understand reading material, increase engagement in learning, and support the achievement of better learning outcomes than learning without the use of Augmented Reality Flashcard media.

Table 5 also shows the results of the t-test with a significance value (Sig. 2-tailed) of 0.000 which is

smaller than 0.05. Thus, the null hypothesis (H₀) is rejected and the alternative hypothesis (H₁) is accepted, meaning that there is a significant difference between the average score of the control class and the experimental class. The difference in the average score of 14,250 indicates that the average score of students in the experimental class is higher than that of the control class. This is strengthened by the 95% confidence interval which is in the range of 7,097 to 21,403, which indicates that the difference is consistent and trustworthy. Based on these results, it can also be concluded that the use of Flashcard Augmented Reality media has a significant influence on improving learning outcomes. This media has been proven to be effective in supporting the learning process and helping students achieve better learning outcomes compared to learning without using Flashcard Augmented Reality media. Based on the results of the tests that have been conducted, it can be concluded that the use of Flashcard Augmented Reality media has a real impact on improving students' abilities, both in terms of literacy and the ability to write short stories. This media helps students understand learning materials more easily, increases interest and motivation to learn, and encourages active involvement during the learning process. Thus, the results of the Independent Samples t-test show that the Flashcard Augmented Reality media developed is effectively used as a learning medium in elementary schools.

Disseminate Stage

The disseminate stage is the last stage in the development of Flashcard Augmented Reality learning media. The implementation of dissemination activities was carried out at SD UMP involving as many as 50 teachers, consisting of teachers in grades I to VI and subject teachers. The involvement of teachers from various levels aims to obtain various inputs and views related to the possibility of applying Flashcard Augmented Reality media at various grade levels and subjects, especially in learning Bahasa Indonesia. In this activity, the researcher explained the background, development objectives, and how to use Flashcard Augmented Reality media in learning. Teachers were given an explanation of the available features, steps to use media, and examples of their application in short story writing activities. In addition, the researcher also showed how to integrate this media with learning materials and activities that have been used in the classroom. During the dissemination activity, teachers were given the opportunity to directly try the use of Flashcard Augmented Reality media. Through this experience, teachers can understand the benefits of media in helping students explore ideas, increase interest and motivation to learn, and facilitate the learning process of writing short stories. This activity is also used as a forum for discussion between researchers and teachers about the advantages of media and opportunities for media development in the future. Based on the results of the discussion and responses given, most teachers gave a positive response to the use of Flashcard Augmented Reality media. Teachers considered that this media is innovative, interesting, and in accordance with the characteristics of elementary school students. In addition, this media is considered to be able to create a more interactive and fun learning atmosphere, especially in learning Indonesian. Overall, the results of the dissemination stage show that Flashcard Augmented Reality media has good potential to be applied more widely in learning in elementary schools. Teachers also suggested that this media continue to be developed and adjusted to learning needs at various grade levels.

DISCUSSION

The results of the study show that the use of Flashcard Augmented Reality media has a significant influence on the literacy ability of elementary school students. This is seen from the difference in average scores between the control class and the experimental class. The control class obtained an average score of 67.50, while the experimental class obtained an average score of 85.00. Statistically, the results of the hypothesis test using the Independent Samples t-test showed a significance value of 0.000 (< 0.05) which means that there is a significant difference between the literacy ability of students in the control class and the experimental class. This shows that the Flashcard Augmented Reality media developed in this study has proven to be effective in improving the literacy skills of elementary school students. The results of this study are in line with research conducted by Setiawan et al., (2025) which shows that Flashcard Augmented Reality learning media is able to improve the

literacy skills of elementary school students because it provides a more interactive learning experience and helps students understand concepts visually. In addition, research from Adityas et al. (2024) which examined the development of Augmented Reality Flashcards for early reading learning also shows that this media is considered very suitable for use in learning and is able to help students improve reading skills at the elementary school level. Research on the use of Augmented Reality-based thematic books in elementary school students shows that AR technology can help students understand learning materials more easily and improve students' literacy skills in understanding reading content (Net et al., 2023). The low score on this indicator shows that students' high-level thinking skills still need to be improved. This is in line with the results of a study Dewi et al. (2018) which states that the use of Augmented Reality technology in learning can help improve students' understanding of concepts and learning engagement, but the development of high-level thinking skills still requires a structured and sustainable learning strategy. In addition, international research also shows that Augmented Reality technology has great potential in improving the reading ability of elementary school students. In line with published research Morfidi and Iatraki (2025) states that the use of Augmented Reality in reading learning is able to help students understand the content of the text better and increase students' motivation to learn because learning becomes more interactive and interesting. The use of Augmented Reality Flashcard media makes a positive contribution to improving the literacy skills of elementary school students. This media is able to help students understand the content of reading more concretely, increase interest in reading, and support active involvement in the learning process.

In addition to improving reading literacy skills, the use of Augmented Reality Flashcard media has also been proven to be effective in improving the ability to write short stories. This can be seen from the difference in the average score of short story writing skills between the control class and the experimental class. The control class obtained an average score of 71.75, while the experimental class obtained an average score of 86.00. The results of the hypothesis test using the Independent Samples t-test showed a significance value of 0.000 (<0.05) which means that there was a significant difference between the ability to write short stories in the control class and the experimental class. This shows that the use of Augmented Reality Flashcard media has a significant influence on improving the ability to write short stories. This media can also help students understand the structure of stories so that they can more easily pour ideas into written form. The findings of this study are also supported by research Athiyah et al. (2024) which states that the use of Augmented Reality technology in language learning can increase students' engagement and creativity in writing activities. In addition, other research also shows that the use of AR technology can improve students' memory and understanding of learning materials so that it is easier for students to develop story ideas in writing activities. In line with research conducted by Ruswanti et al. (2025) shows that the use of Augmented Reality Flashcards can improve storytelling skills in children. This media provides a more interactive learning experience so that children can more easily understand storylines and develop ideas in storytelling activities. The storytelling ability is closely related to the ability to write narratives or short stories because both involve the ability to organize ideas, arrange storylines, and express ideas sequentially. The results of this study show that the use of Augmented Reality Flashcard media is not only effective in improving reading literacy skills, but also able to improve the ability to write short stories in elementary school students. This media helps students understand the elements of stories, develop ideas, and arrange storylines more systematically.

The findings of this study indicate that the use of Augmented Reality Flashcard media has a significant influence on improving the writing ability of short stories of elementary school students. The results of the study show that the application of AR technology is able to provide a more interactive and contextual learning experience, thus helping students in understanding the structure of the story, organizing ideas, and pouring them in a series in the form of writing. Theoretically, these results are in line with the Cognitive Theory of Multimedia Learning which emphasize that the combination of visual and verbal information can improve comprehension and reduce cognitive load (Chen & Lee, 2019). In addition, the use of AR is also relevant to constructivist theory, which views that knowledge is built through active and meaningful learning experiences (Yilmaz & Goktas,

2017). This improvement in writing skills is also related to storytelling skills, where visualizations presented through AR help students understand story elements such as plot, characters, and setting, thus facilitating the development of ideas in narrative writing (Koç et al., 2022; Li et al., 2025). Thus, AR Flashcard media not only serves as a learning tool, but also as an effective means in supporting the development of integrated literacy, especially short story writing skills in elementary school students.

The findings of this study have a significant impact on learning practices in elementary schools, especially in the integration of technology to improve student literacy. Augmented Reality flashcard media not only plays a role in improving reading skills, but also supports the development of writing skills in an integrated manner, so that it can be used as an alternative learning media that is more interactive and contextual (Pan et al., 2021; Hafidah & Pudyaningtyas, 2020). From a practical perspective, teachers can utilize AR technology to improve student engagement and learning outcomes, while theoretically this research emphasizes the importance of AR's role in integrated literacy learning. In addition, the results of this study also provide opportunities for the development of further studies that can examine the application of similar media at various levels of education and other literacy aspects.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the Augmented Reality Flashcard media developed is declared feasible and practical. The use of Augmented Reality Flashcard has also been proven to be effective in improving reading literacy and short story writing skills of elementary school students. The test results showed that the average score of students' literacy and short story writing skills in the experimental class was higher than that of the control class. These findings show that Flashcard Augmented Reality media is able to function as a thinking tool (scaffolding) that bridges the understanding of reading texts with students' ability to develop ideas and compose stories sequentially.

Augmented Reality Flashcard media can be used as an innovative alternative learning media to support literacy learning in reading and writing short stories. The use of Augmented Reality Flashcards is expected to be actively used as a fun and meaningful means of learning. Students are expected to not only use media to see visualizations, but also to help the thinking process in understanding reading and composing stories systematically. For schools, the results of this research can be used as a consideration in supporting the development and implementation of technology-based learning, especially in improving the quality of literacy learning in elementary schools. Further research can develop Augmented Reality Flashcards with a wider scope of material, involve a larger number of subjects, and test the effectiveness of media at different grade levels in order to obtain more comprehensive research results as an example in high grades in elementary schools.

ACKNOWLEDGMENT

The researcher expressed his gratitude to the Postgraduate, University of Muhammadiyah Purwokerto for supporting the research so that it ran smoothly and successfully.

REFERENCES

- Al-Ansi, A. M., Jaboob, M., Garad, A., & Al-Ansi, A. (2023). Analyzing augmented reality (AR) and virtual reality (VR) recent development in education. *Social Sciences & Humanities Open*, 8(1), 100532.
- Athiyah, N., Maula, N. N. M., Khobir, A., & Rini, J. (2024). Augmented Reality (AR) learning: Improving students memory in science learning at the elementary school level. *Madako Elementary School*, 3 (2), 152–164. <https://doi.org/10.1177/0735633119854028>
- Dorris, C., Winter, K., O'Hare, L., & Lwoga, E. T. (2024). Mobile device use in the primary school classroom and impact on pupil literacy and numeracy attainment: A systematic review. *Campbell Systematic Reviews*, 20(2), e1417. <https://doi.org/10.1002/cl2.1417>
- Eryuni Ramdhayani. (2023). Pentingnya Literasi dalam Menumbuhkan Nilai-Nilai Karakter Di Era Digital. *Jurnal*

Kependidikan, 5(2), 1–14.

- Hardiyanti, A. S., Suherman, S., & Suharto, T. H. (2024). Pengembangan media flash card berbasis Canva materi membaca pada mata pelajaran Bahasa Indonesia kelas I Sekolah Dasar. *Jurnal Pendidikan Dasar Setia Budhi (JPDS)*, 8(1), 28-33.
- Helsa, Y., & Kenedi, A. K. (2019). Edmodo-based blended learning media in learning mathematics. *Journal Of Teaching And Learning In Elementary Education (JTLEE)*, 2(2), 107-117.
- Khusna, M., & Yusuf, A. (2026). Implementasi Model Pembelajaran Blended Learning pada Pendidikan Kesetaraan Paket C di PKBM Tunas Mekar. *JIP-Jurnal Ilmiah Ilmu Pendidikan*, 9(1), 440-445.
- Koç, Ö., Altun, E., & Yüksel, H. G. (2022). Writing an expository text using augmented reality: Students' performance and perceptions. *Education and Information Technologies*, 27(1), 845-866. <https://doi.org/10.1007/s10639-021-10438-x>
- Kuntari, S. (2023). Pemanfaatan Media Digital dalam Pembelajaran. *Prosiding Seminar Nasional Fakultas Tarbiyah Dan Ilmu Keguruan IAIM Sinjai*, 2, 90–94. <https://doi.org/10.47435/sentikjar.v2i0.1826>
- Kurniasih, E., Widuroyeki, B., & Masduki, L. R. (2023). Implementation of Augmented Reality-based thematic elementary school textbooks to improve students' literacy skills. *Pegem Journal of Education and Instruction*, 13(4), 379-387. <https://doi.org/10.47750/pegegog.1>
- Lai, A. F., Chen, C. H., & Lee, G. Y. (2019). An augmented reality-based learning approach to enhancing students' science reading performances from the perspective of the cognitive load theory. *British Journal of Educational Technology*, 50(1), 232-247. <https://doi.org/10.1111/bjet.12716>
- Li, M., Wang, X. X., Chen, Y., & Cukurova, M. (2025). Augmented reality and generative learning in K-12 writing: Performance outcomes and the mediating roles of motivation and metacognition. *Computers & Education*, 105538. <https://doi.org/10.1016/j.compedu.2025.105538>
- Morfidi, E., & Iatraki, G. (2025). Improving Reading Ability Using Augmented Reality. *Education Sciences*, 15(10), 1280.
- OECD. TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners. Paris: OECD Publishing, 2019. <https://doi.org/10.1787/1d0bc92a-en>
- Pan, Z., López, M., Li, C., & Liu, M. (2021). Introducing augmented reality in early childhood literacy learning. *Research in Learning Technology*, 29(1), 1-15. <https://doi.org/10.25304/rlt.v29.2539>
- Ruswanti, T., Jannah, M., Fitri, R., Kristanto, A., Dewi, U., & Lasarus, Y. M. (2025). Effect of Augmented Reality Flash Card Media on Reading Interest and Storytelling Ability in Children Aged 5-6 Years. *International Journal of Emerging Research and Review*, 3(2), 000096-000096. <https://doi.org/10.26555/jpsd.v11i2.a30427>
- Ruswanti, T., Jannah, M., Fitri, R., Kristanto, A., Dewi, U., & Lasarus, Y. M. (2025). Effect of Augmented Reality Flash Card Media on Reading Interest and Storytelling Ability in Children Aged 5-6 Years. *International Journal of Emerging Research and Review*, 3(2), 000096-000096.
- Sharmin, N., & Chow, A. K. (2020). Augmented reality application to develop a learning tool for students: Transforming cellphones into flashcards. *Healthcare Informatics Research*, 26(3), 238–242. <https://doi.org/10.4258/hir.2020.26.3.238>
- Tarmidzi, T., Andari, K. D. W., Sari, A., Nuryanti, M., Arfiyanti, R., & Noto, M. S. (2025). Augmented Reality and Its Use in Elementary School Education: A Systematic Literature Review. *Jurnal Prima Edukasia*, 13(1), 128-145.
- Yilmaz, R. M., & Goktas, Y. (2017). Using augmented reality technology in storytelling activities: examining elementary students' narrative skill and creativity. *Virtual reality*, 21(2), 75-89. <https://doi.org/10.1007/s10055-016-0300-1>