

DEVELOPMENT OF AUGMENTED REALITY E-BOOKLET TO IMPROVE STUDENTS' LEARNING OUTCOMES ON EARTH STRUCTURE MATERIAL

Salsabila Laily Amalina¹, Mochammad Desta Pradana², Atika Anggraini³

UIN Syekh Wasil, Indonesia

salsabilalailya03@gmail.com; destapradana83@iainkediri.ac.id

Abstract

This study addresses the persistent issue of low academic performance among Grade VIII students at SMPN 9 Kediri, where the average cognitive score of 68.95 fell below the established minimum mastery criterion (KKTP) of 75. The research aimed to develop an Augmented Reality (AR)-based e-booklet as an instructional medium to enhance student learning outcomes on the topic of Earth's structure. Employing a Research and Development (R&D) methodology guided by the ADDIE model, the study involved 34 students from class VIII A. The learning media integrated text, images, and 3D AR visualizations to support students' understanding of abstract geological concepts. Validation was conducted through expert evaluations in material, design, and media, with feasibility scores of 97.5%, 95.7%, and 97.1%, respectively. Effectiveness was assessed through pretest and posttest analysis using a paired sample t-test and N-Gain calculation. The results indicated a statistically significant improvement ($p = 0.000 < 0.05$) and an N-Gain score of 0.6597, reflecting a moderate level of effectiveness. The study concludes that the AR-based e-booklet is an effective educational tool for improving learning outcomes. These findings highlight the potential of AR-integrated digital media to facilitate student comprehension of complex scientific content.

Keywords: Augmented Reality; E-Booklet; Learning Media; Student Performance; Earth Structure

INTRODUCTION

Education plays an important role in life, especially in the era of globalization like today. Through education, a person can learn many things, ranging from basic skills such as reading and writing, to understanding more complex sciences (Hariyasasti, 2025). Education is also the main key in improving human quality to be able to face various challenges in the 21st century, such as technological developments, social changes, and economic and environmental problems (Cynthia & Sihotang, 2023). However, in reality, there are still many students who have not received an optimal learning process. In some areas, educational facilities are still limited and the learning methods used are less attractive. Many teachers still use old teaching methods and tend to be boring, so students become less enthusiastic about learning. As a result, students have difficulty understanding the lessons and their learning scores become low (Zahara et al., 2022).

Learning outcomes are a measure of how far students have understood the material after following the learning process (Fidya et al., 2021). These results are very important because they show whether or not the learning objectives have been achieved. Unfortunately, many students have difficulty achieving good learning outcomes. One of the main causes is learning methods that are not in accordance with the needs and ways of learning students. In addition, the lack of media or learning aids also affects students' low understanding of subject matter (Zulaiha et al., 2024).

In this digital era, technology should be a solution to overcome these problems. Technology allows learning to be done in a more interactive and fun way. Students can learn through videos, simulations, or other digital media that are easier to understand (Hasmiza, 2025). One of the interesting technologies to use in learning is Augmented Reality (AR), which is a technology that combines 2D or 3D virtual objects into the real world and can be displayed directly through devices such as mobile phones or tablets. This technology can help students understand the subject matter visually and realistically (Depita, 2024).

Based on the results of observations and interviews with science teachers at SMPN 9 Kediri, it is known that teachers have implemented differentiated learning to adjust to students' learning needs. Even so, the learning outcomes of grade VIII A students are still quite varied. Of the 34 students, only 4 achieved a score above the KKTP (75), while the average student score was still at 68.95. This shows that there are still many students who

have difficulty understanding the material, especially on the topic of the structure of the earth. One of the reasons is the lack of use of learning media that is interesting and makes it easier for students to learn. To overcome these problems, innovative and interactive learning media are needed. Therefore, this research aims to develop Augmented Reality (AR)-based e-booklet media that can be used in science learning, especially on earth structure materials. This media is expected to be able to help students understand abstract concepts more easily through an interactive three-dimensional visual display.

In this study, class VIII A was chosen as the subject because based on the needs analysis, students in this class need more interesting and effective learning media. The school also already has supporting facilities such as science laboratories and computers, but the use of technology is still not optimal. The development of AR-based e-booklets is expected to be a solution, as this medium combines color images and virtual objects that can be accessed directly by students using their devices. In addition to using AR technology, the development of this media is also based on the theory of behaviorism which emphasizes the importance of the learning process through stimulation and response. With hands-on interaction with virtual objects, students can have a fun learning experience and at the same time get hands-on feedback (Darmayanti et al., 2024). Through this approach, teachers can more easily evaluate students' understanding based on their responses and learning outcomes.

Based on this description, this research aims to develop an Augmented Reality-based e-booklet media to improve student learning outcomes on earth structure materials. This material was chosen because it is abstract and is often difficult for students to understand if it is only delivered orally or through textbooks. By utilizing Augmented Reality technology, students can see three-dimensional visualizations of the earth's layers directly through digital devices, thus hopefully improving their understanding and learning outcomes (Pramesti, 2024). The focus of this research is to examine the feasibility and effectiveness of Augmented Reality-based e-booklet media in science learning in grade VIII students at SMPN 9 Kediri.

METHODS

This study employed a Research and Development (R&D) method, which is used to create or develop a product that is then tested to determine its quality and effectiveness.

The main objective of this method is to produce a useful product and assess whether it is feasible for use and can be further developed. In this research, the development model used was the ADDIE model, which consists of five stages: Analysis (needs analysis), Design (product design), Development (product development), Implementation (product implementation), and Evaluation (assessment or evaluation) (Nailiah & Saputra, 2022). The ADDIE model was chosen due to its several advantages. First, evaluation is conducted at every stage, allowing immediate revisions and improvements to the product. Second, the model is simple and structured, with each stage interconnected from beginning to end. Third, the ADDIE model is easy to understand, making it convenient for researchers to develop instructional products (Andres et al., 2023).

The research subjects were students from class VIII A at SMPN 9 Kediri, with the study conducted during the even semester of the 2024/2025 academic year. The sampling technique used was judgment sampling, in which participants are selected based on specific considerations determined by the researcher. The research involved two stages of trials: a small group trial and a large group trial.

The data collection instruments included interviews, observations, tests, and questionnaires. Interviews and observations were used to gather direct information from teachers and students, while tests were administered to assess students' understanding of the material. The questionnaire was constructed using a Likert scale ranging from 1 to 5 to measure respondents' attitudes or opinions (Sumartini et al., 2020). The validity of the questionnaire was tested using Microsoft Excel, and its reliability was tested using SPSS. With instruments that had undergone validity and reliability testing, the data collected were expected to be accurate and trustworthy.

Data analysis in this study was carried out to determine the effectiveness of the treatment given. The analysis phase began with a normality test to check whether the data were normally distributed. If the data were normally distributed, a t-test was then conducted to compare pretest and posttest scores in order to determine if there were significant differences (Cahyaningsih et al., 2020). In addition, an N-Gain test was used to measure the increase in student learning outcomes before and after the intervention. Through these three tests, the researcher was able to conclude the extent to which the treatment was effective in improving student learning outcomes (Sarwastuti & Purnomo, 2023).

RESULTS

This research was conducted during the 2024/2025 academic year in class VIII A at SMPN 9 Kediri, involving a total of 34 students with the subject matter focused on the structure of the Earth. The learning media was developed using a combination of two main applications: Canva and Assemblr Edu. Canva was used to design and layout the e-booklet, including text, images, and page formatting, to ensure that it appears attractive and easy to read for students. Meanwhile, Assemblr Edu was utilized to create 3D augmented reality (AR) models of the Earth's structural layers. These models were then integrated into the e-booklet through barcodes or scannable links that students could access using an AR application, allowing them to visualize the material directly and interactively. The combination of these two applications resulted in a digital, interactive, and accessible learning tool.

After the media was developed, the next step was to conduct a validity test of the questionnaire. This step was crucial to ensure that each item in the questionnaire accurately measured what it was intended to assess. During the validation process, each question item was analyzed to verify that its content was clear, understandable, and reflective of the targeted aspect of the study. Items that were found to be invalid were revised or replaced accordingly (Kurniawan, 2022). By performing this validity test in advance, the resulting questionnaire was of higher quality and capable of generating reliable data when distributed to expert validators for further validation. The results of the validity test are presented in Tables 1 and 2 below.

Table 1 Validity Test Calculation

Item	Rater		S1	S2	Σs	n(c-1)	V	Category
	I	II						
Item 1	5	4	4	3	7	8	0,875	Very High
Item 2	5	4	4	3	7	8	0,875	Very High
Item 3	5	5	4	4	8	8	1	Very High
Item 4	5	4	4	3	7	8	0,875	Very High
Item 5	5	5	4	4	8	8	1	Very High
Item 6	5	4	4	3	7	8	0,875	Very High
Item 7	5	4	4	3	7	8	0,875	Very High
Item 8	4	5	3	4	7	8	0,875	Very High
Item 9	4	4	3	3	6	8	0,75	High

Table 2 Average Validity Score Calculation

Item	Rater		S1	S2	Σs	V	Category
	I	II					
Item 1-9	43	39	34	30	64	0,888889	Very High

Based on the validity calculation results using Aiken’s V formula presented in Table 1 and Table 2, it was found that out of 9 items assessed by two validators, 8 items fell into the “very high” category, with values ranging from 0.875 to 1, while 1 item was categorized as “high” with a V value of 0.75. The average Aiken’s V score for all items was 0.888889, which is classified as very high (N. Amalia et al., 2022). This indicates that the questionnaire instrument has good content validity and is suitable for use in data collection for this research.

Furthermore, a reliability test was conducted to determine whether the questionnaire could produce consistent results when assessed by more than one person, using Cronbach's alpha (R. N. Amalia & Dianingati, 2022). The results of this reliability test are presented in Table 3 below.

Table 3 Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items.
,703	9

Based on the results of the reliability test presented in Table 3, the Cronbach’s Alpha value was 0.703 for an instrument consisting of 9 items. This value indicates that the questionnaire has a fairly good level of reliability.

After the questionnaire is declared valid, the media is then tested for feasibility. The feasibility test process is carried out by asking for opinions from experts, namely material experts, design and media experts, as well as pretest and posttest experts. They were asked to give an assessment of the content of the material, the appearance of the media, and the questions used (Zuhdi, 2021). The validation of material experts aims to ensure that the content of the e-booklet is correct and in accordance with the curriculum. Design and media validation was carried out to assess whether the e-booklet's appearance was attractive and easy to use by students. Meanwhile, the pretest and posttest validation aim to

see whether the questions used can measure student learning outcomes well. The results of all these validations are used to improve and refine the media before it is finally piloted to students (Yuliasuti & Soebagyo, 2021). The results of material validation, design and media validation, pretest and posttest validation are presented in the following tables 4, 5, and 6.

Table 4 Data Analysis of Material Validation Results

No.	Indicator	Material Expert	
		X1	X2
Learning Objectives			
1.	Learning objectives are included in the <i>e-booklet</i> .	5	5
2.	Learning objectives that are in accordance with the material presented.	5	5
Learning Materials			
1.	Conformity of e-booklet learning media with Curriculum Content Standards	5	5
2.	Material suitability based on references	5	5
3.	Presentation of text, images and 3D media animations is appropriate	5	5
4.	Develop logical thinking skills	4	5
5.	Fostering students' curiosity	5	5
6.	Improving the ability to cooperate and activeness between students	5	5
Learning Methods			
1.	The choice of learning method is right	5	5
Language/Readability Eligibility			
1.	The language used in the e-booklet is easy to understand	4	5
2.	The use of the Indonesian language in accordance with EYD	5	5
Learning Activities			
1.	Introduction in the <i>and-booklet</i> Learning is right	5	5
2.	Giving questions at the end of each discussion is appropriate to find out the understanding	5	5
3.	The conclusion in <i>the booklet</i> is clear and precise	4	5
Total		67	70
Percentage Eligibility Score		95%	100%
Average		97,5%	
Category		Highly feasible	

Calculation of material expert qualification 1:

$$P = \frac{67}{70} \times 100\%$$

$$= 95\%$$

Calculation of material expert qualification 2:

$$P = \frac{70}{70} \times 100\%$$

$$= 100\%$$

Based on the calculation results, it can be concluded that the content of the material in the e-booklet is in the category of "very feasible". This means that the material presented in the e-booklet is appropriate and can be used as a learning medium to support the student learning process in the classroom.

Table 5 Data Analysis of Design and Media Validation Results

No.	Indicator	Design and Media Expert	
		X1	X2
Media Design			
1.	The presentation of learning objectives in the media is clear and in accordance with the curriculum	5	5
2.	The use of learning strategies in e-booklets is appropriate	5	5
3.	Delivery of learning media increases student learning attractiveness	5	5
4.	Suitability of size, layout and clarity in images and <i>augmented reality media</i>	5	5
5.	Shape, color, and size suitability	4	5
6.	Use of legible fonts and sizes	4	5
7.	Cover illustration and <i>e-booklet</i> describe the contents of the book	4	5
8.	There are clear indications of media use	5	5
9.	<i>Augmented reality</i> depicts the actual scene	4	5
10.	The appearance of the design is not confusing and is in keeping with the theme of the earth's structure	4	5
Visual Communication			
1.	The material in <i>the Augmented reality-based e-Booklet</i> is well conveyed	4	5
2.	The display of images and 3D media animations on learning media is interesting	5	5
3.	The quality of 3D animation media in <i>Augmented reality</i> is good and clear	5	5
4.	The combination of every element in <i>Augmented reality</i> is good	5	5
5.	Able to present concepts in earth structure material in an interactive and interesting way	4	5
Ease of Use			
1.	<i>E-Booklets</i> are easy to access and operate	4	5
2.	<i>Augmented reality-based E-Booklet</i> can be used repeatedly	5	5
3.	<i>Augmented reality-based E-Booklets</i> can be used for independent learning	5	5
4.	<i>Augmented reality-based e-Booklets</i> can run well without interruptions	5	5
Content Content			

1.	The information presented in <i>the Augmented</i> reality-based <i>E-Booklet</i> related to the earth's structural matter is accurate and relevant	4	5
2.	Animations and visualizations help make it easier for students to understand	5	5
Total		96	105
Percentage Eligibility Score		91,4%	100%
Average		95,7%	
Category		Highly feasible	

Calculation of the feasibility of design and media experts 1:

$$P = \frac{96}{105} \times 100\%$$

$$= 91,4\%$$

Calculation of the feasibility of design and media experts 2:

$$P = \frac{105}{105} \times 100\%$$

$$= 100\%$$

The calculation results show that the media and e-booklet design fall into the "very feasible" category. This means that the appearance of the e-booklet is attractive, easy to use, and supports students' comfort in learning, so that it can increase their enthusiasm when reading.

Table 6 Data Analysis of Pretest and Posttest Validation Results

No.	Indicator	Pretest and Posttest Expert	
		X1	X2
Question Item			
1.	KD linkages and indicators	5	5
2.	Clarity of question items	5	5
3.	Clarity of workmanship instructions	5	5
4.	Conformity of the question item to the material	4	5
Language Use			
1.	Accuracy of language or word usage	5	5
2.	The language used is in accordance with the cognitive skills of the students	5	5
Valuation			
1.	Accuracy of grades on each question item	4	5
Total		33	35
Percentage Eligibility Score		94,2%	100%
Average		97,1%	
Category		Highly feasible	

Pretest and *posttest* eligibility calculation 1:

$$P = \frac{33}{35} \times 100\%$$

$$= 94,2\%$$

Calculation of *pretest* and *posttest* eligibility 2:

$$P = \frac{35}{35} \times 100\%$$

$$= 100\%$$

Based on the results of the calculation, a score was obtained that was included in the category of "very feasible", which shows that the pretest and posttest questions have been well arranged, clear, and can be used in research to measure the improvement of student learning outcomes.

After going through the feasibility test stage, the next step is to conduct an effectiveness test to find out how much influence the media has on student learning outcomes. This effectiveness test is carried out through several stages of analysis, namely the normality test to ensure the data is distributed normally, followed by a t-test to see a significant difference between pretest and posttest scores, and the N-Gain test to measure the improvement of student learning outcomes after using the developed media (Pangkerego et al., 2021). The results of the normality test are presented in the following table 7.

Table 7 Normality Test Results

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Itself.	Statistic	df	Itself.
<i>pretest</i>	,119	34	,200*	,961	34	,258
<i>posttest</i>	,174	34	,010	,941	34	,067

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The test results showed that the pretest data had a significance value of 0.258 and the posttest data of 0.067. Since the two values are greater than 0.05, it can be concluded that the pretest and posttest data are normally distributed (Pratama & Khumaedi, 2021). Thus, the data meets the criteria to be analyzed using a parametric statistical test, namely the t-test. The results of the t-test are presented in the following table 8.

**Table 8 Results of the t test
Paired Samples Test**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Error	95% Confidence Interval of the Difference					
			Lower	Upper				
Paired Samples Test	-27,5000	3,00215	-33,60793	-21,39207	-9,163	33	,000	

Based on the test results, it was found that there was a significant difference between students' pretest and posttest scores. After using the e-booklet, the average student score increased by 27.5 points. A significance value of 0.000 that is smaller than 0.05 indicates that the increase is statistically significant (Nashikhah & SB, 2025).

Furthermore, the N-Gain Test is carried out to measure the extent of the improvement in student learning outcomes after previously taking the t-test (Parawansa et al., 2022). This test compares pretest and posttest scores to determine the level of improvement in student understanding after using the learning media that has been designed (Puspitasari et al., 2025). The results of the N-Gain test are presented in the following table 9.

Table 9 N-Gain Test Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Hours of deviation
NGain_Score	34	,25	1,00	,6491	,24964
Ngain_Persen	34	,25	100,00	64,9144	24,96440
Valid N (listwise)	34				

Based on this data, the average N-Gain score obtained is 0.6491 or equivalent to 64.9144% in the form of percentage. This score is classified as medium according to the N-Gain interpretation criteria. This shows that there is a significant increase in learning outcomes after the application of learning media.

DISCUSSION

This study analyzes the development and implementation of an Augmented Reality (AR)-based e-booklet to improve student learning outcomes on the topic of Earth's structure. The effectiveness of the media was evidenced by a paired sample t-test result with a significance value of 0.000 (< 0.05), and an N-Gain score of 0.6597, categorized as moderate. This indicates that the media significantly enhanced students' cognitive achievement. The increase in scores demonstrates the effectiveness of integrating AR elements into science learning, particularly in abstract topics like Earth's structure. By interacting directly with 3D models, students were better able to visualize and understand the layered composition of the Earth, which aligns with the objectives of the research and supports the behaviorist learning theory that emphasizes stimulus and response.

When compared to previous studies, the results are consistent with those of Aslamiyah (2024), who reported a significant increase in student performance through the use of AR-based booklets in learning global warming. Hanifah and Afrikani (2020) also found that e-booklets improved students' learning outcomes with an N-Gain of 0.5, although their media did not include AR. The current study's higher gain score may be attributed to the immersive and interactive nature of AR content. Additionally, Muhammad and Hidayat (2023) reported gains in student learning using AR e-booklets on the human hormonal system, though their results (N-Gain 0.35) were lower than those in this study.

These comparisons indicate that AR content, especially in topics requiring spatial understanding, offers added value. In contrast, studies such as that by Febriyanti Utami and Rukiyah (2021) using AR flashcards for early learners showed effectiveness in recognition skills, but differ in cognitive depth and subject scope. Rossi and Eka (2022) highlighted the practicality and validity of AR media in teaching animal classification, which aligns with this study's expert validation results exceeding 95% across categories. Collectively, these findings reinforce that AR-based media are feasible, valid, and effective in science education. The results contribute both theoretically and practically by affirming the benefits of AR in enhancing engagement and understanding in line with behaviorist principles, while also offering a practical tool for differentiated and flexible learning.

However, the study has limitations. The implementation was confined to a single class with 34 students, limiting generalizability. Moreover, the media's reliance on technology may pose accessibility issues in under-resourced settings. The study also

focused only on cognitive domains (C1–C4), excluding affective and psychomotor aspects. Limited time and scope also constrained broader trials and refinements. Future research is encouraged to expand testing across multiple contexts, develop offline-compatible AR media, and explore impacts across a wider range of learning domains to strengthen the application of AR in education.

CONCLUSION

This study successfully developed an AR-based e-booklet using the ADDIE model to address the low academic performance of Grade VIII students in understanding the structure of the Earth. The media met high standards of validity and feasibility, as indicated by expert validation scores exceeding 95%. Furthermore, its effectiveness in improving student learning outcomes was demonstrated through a significant paired sample t-test result and an N-Gain score of 0.6597, categorized as moderate. These findings confirm that the AR-based e-booklet aligns with the study's objectives by enhancing students' understanding of abstract scientific content through interactive 3D visualizations. The research contributes to science education by providing empirical support for the integration of Augmented Reality into classroom instruction, particularly in junior high school science subjects that involve complex spatial concepts.

Despite its promising outcomes, the study has certain limitations. The implementation was limited to a single class with 34 students, restricting the generalizability of the findings. Additionally, the media relies on digital devices and internet connectivity, which may not be readily available in all educational settings. These contextual factors should be considered when applying or replicating the findings.

Based on these limitations, future research is recommended to test the scalability of the AR-based e-booklet across different schools and regions with varied resource availability. Further studies could also examine the long-term effects of AR integration on student motivation, retention, and academic performance across different domains. Exploring the development of offline-compatible AR media and improving device accessibility will also be critical to maximizing the reach and effectiveness of this educational innovation.

REFERENCES

- Amalia, N., Ermawati, D., & Kuryanto, M. S. (2022). Pengaruh Penggunaan Metode Hypnoteaching terhadap Motivasi Belajar Matematika Siswa Sekolah Dasar. *JIIP- Jurnal Ilmiah Ilmu Pendidikan*, 5(7), 2148–2155. <https://doi.org/10.54371/jiip.v5i7.685>
- Amalia, R. N., & Dianingati, R. S. (2022). Pengaruh jumlah responden terhadap hasil uji validitas dan reliabilitas kuesioner pengetahuan dan perilaku swamedikasi. *Generics: Journal of Research in Pharmacy*, 2(1), 9–15. <https://ejournal2.undip.ac.id/index.php/generics/article/view/12271>
- Andres, N., Alpusari, M., & Sari, I. K. (2023). Pengembangan E-Lkpd Pada Pembelajaran Ipa Di Kelas V Sekolah Dasar. *Jurnal Kiprah Pendidikan*, 2(3), 241–254. <https://journal.uir.ac.id/index.php/kiprah/article/view/16744>
- Cahyaningsih, R. N., Siswanto, J., & Sukamto, S. (2020). Keefektifan model project based learning berbantu multimedia power point terhadap hasil belajar IPA. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 4(1), 34–40. <https://journal.unnes.ac.id/sju/index.php/jppp/article/view/38842>
- Cynthia, R. E., & Sihotang, H. (2023). Melangkah bersama di era digital: pentingnya literasi digital untuk meningkatkan kemampuan berpikir kritis dan kemampuan pemecahan masalah peserta didik. *Jurnal Pendidikan Tambusai*, 7(3), 31712–31723. <https://jptam.org/index.php/jptam/article/view/8077>
- Depita, T. (2024). Pemanfaatan teknologi dalam pembelajaran aktif (active learning) untuk meningkatkan interaksi dan keterlibatan siswa. *TARQIYATUNA: Jurnal Pendidikan Agama Islam Dan Madrasah Ibtidaiyah*, 3(1), 55–64. <https://jurnal.staialhidayahbogor.ac.id/index.php/tarqiyatuna/article/view/1069>
- Fidya, I., Romdanih, R., & Oktaviana, E. (2021). Peningkatan hasil belajar IPS melalui media game interaktif Wordwall. *Prosiding Seminar Nasional Pendidikan STKIP Kusuma Negara III*, 219–227. <https://jurnal.stkipkusumanegara.ac.id/index.php/semnas/article/view/1776>
- Hariyasasti, Y. (2025). Literasi Teknologi dan Pemanfaatan Alat Digital di Sekolah Dasar. *International Journal Of Social, Policy And Law*, 6(3), 13–29. <https://ijospol.com/index.php/ijospol/article/view/290>
- Hasmiza, H. (2025). Model kurikulum pendidikan Islam di era digital: Mengoptimalkan teknologi untuk pembelajaran yang inovatif. *Research and Development Journal of Education*, 11(1), 164–177. <https://journal.unesa.ac.id/index.php/rdje/article/view/25966>
- Nailiah, I. M., & Saputra, E. R. (2022). Pengembangan media ICT berbasis video animasi pada pembelajaran bahasa Indonesia di SD. *JIPD (Jurnal Inovasi Pendidikan Dasar)*, 6(1), 8–15. <https://jurnal.ustjogja.ac.id/index.php/jipd/article/view/11050>
- Nashikhah, M., & SB, N. S. (2025). Pengembangan Media Digital Smart Booklet Menggunakan Strategi Story Maps Upaya Peningkatan Membaca Pemahaman Siswa Kelas III SD Negeri Pulosari 1. *Autentik: Jurnal Pengembangan Pendidikan Dasar*, 9(1), 147–159. <https://jurnal.untirta.ac.id/index.php/autentik/article/view/22193>
- Pangkerego, K. A. J., Sojow, L., & Manggopa, H. K. (2021). Pengaruh Model Blended Learning Terhadap Hasil Belajar Simulasi Dan Komunikasi Digital Siswa Kelas X

- SMK Negeri 1 Tomohon. *EduTIK: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi*, 1(1), 55–68.
<https://ejournalunsrat.unsrat.ac.id/index.php/edutik/article/view/31789>
- Parawansa, K. I., Haryanto, S., & Mulyani, P. S. (2022). Penggunaan Media Flashcard Untuk Meningkatkan Kemampuan Membaca Siswa Pada Mata Pelajaran Bahasa Indonesia Di Mi Klesman. *Jurnal Informatika Dan Teknologi Pendidikan*, 2(2), 72–78.
<https://journal.unesa.ac.id/index.php/jitp/article/view/20693>
- Pramesti, A. (2024). *Pengembangan Booklet Struktur Bumi Berbasis Augmented Reality untuk Peserta Didik Kelas VIII SMP/MTS*. UIN Sunan Kalijaga Yogyakarta.
<http://digilib.uin-suka.ac.id/id/eprint/59048>
- Pratama, D. D., & Khumaedi, M. (2021). Penggunaan Media Pembelajaran Audio Visual Sebagai Upaya Meningkatkan Hasil Belajar Siswa Pada Kompetensi Pemberian Ukuran Gambar Teknik. *Jurnal Pendidikan Teknik Mesin*, 21(1).
<https://journal.unnes.ac.id/nju/index.php/jptm/article/view/25718>
- Puspitasari, I. B., Reffiane, F., & Azizah, M. (2025). Efektivitas Model Project Based Learning terhadap Hasil Belajar IPAS Materi Tumbuhan pada Siswa Kelas IV SDN Gayamsari 01. *JURNAL PENDIDIKAN MIPA*, 15(2), 635–642.
<https://journal.unnes.ac.id/sju/index.php/jpm/article/view/63909>
- Sarwastuti, H. T., & Purnomo, Y. W. (2023). Pengaruh Problem Based Learning Terhadap Keterampilan Berpikir Kritis Matematika Materi Lingkaran. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 12(1), 473–482.
<https://jurnal.unimed.ac.id/2012/index.php/aksioma/article/view/39862>
- Sumartini, S., Harahap, K. S., & Sthevany, S. (2020). Kajian pengendalian mutu produk tuna loin precooked frozen menggunakan metode skala likert di perusahaan pembekuan tuna. *Aurelia Journal*, 2(1), 29–38.
<https://aureliajournal.com/index.php/aurelia/article/view/47>
- Yuliastuti, R., & Soebagy, J. (2021). Pengembangan Bahan Ajar Matematika Berbasis Matematika Terapan pada Materi Matriks. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 5(3), 2270–2284. <https://jurnal.usk.ac.id/jpm/article/view/22701>
- Zahara, R., Nasution, F. S., Yusnadi, Y., & Surya, E. (2022). Implementasi pembelajaran blended learning di jenjang sekolah dasar. *Jurnal Basicedu*, 6(4), 6482–6490.
<https://jbasic.org/index.php/basicedu/article/view/3671>
- Zuhdi, U. (2021). *Pengembangan Media Pembelajaran Interaktif Menggunakan Articulate Storyline 3 Pada Materi Sifat dan Perubahan Wujud Benda Untuk Meningkatkan Hasil Belajar Siswa Kelas V SD*. <http://repository.uin-malang.ac.id/10777/>
- Zulaiha, E., Sari, D. N., Rahmat, M., Azzahra, D., & Lestari, D. (2024). Analisis Tantangan Meningkatkan Minat Belajar di Sekolah Dasar. *Journal of Education Research*, 5(1).
<https://journal.unesa.ac.id/index.php/eduresearch/article/view/25995>
- Darmayanti, R., Sukriyah, Y., Sahara, N., Suprayitno, K., & Susetyarini, R. E. (2024). *Behaviorisme dalam Pendidikan: Pembelajaran Berbasis Stimulus-Respon*. Penerbit Adab.
<https://doi.org/10.5281/zenodo.10987654>
- Kurniawan, H. (2022). *Pengantar praktis penyusunan instrumen penelitian*. Deepublish.
<https://penerbitbukudeepublish.com/shop/pengantar-praktis-penyusunan-instrumen-penelitian/>

Maulani, G., Septiani, S., Susilowaty, N., Rusmayani, N. G. A. L., Evenddy, S. S., Nababan, H. S., Setiadi, K., Rahayu, I., Simanungkalit, L. N., & Edi, S. (2024). *Evaluasi Pembelajaran*. Sada Kurnia Pustaka. <https://sada-kurnia-pustaka.business.site/posts/3547821898234619847>