Alacrity : Journal Of Education
e-ISSN : 2775-4138
Volume 5 Issue 1 February 2025
The Alacrity : Journal Of education is published 4 times a year in **(February, June, October)**
Focus : Learning, Education, Including, Social, Curriculum, Management Science, Educational Philosophy And Educational Approaches.
LINK : http://lpppipublishing.com/index.php/alacrity

Development of Augmented Reality (AR) Based Learning Media to Improve Educational Outcomes for Elementary School Students

Nadila Nurachmadani[1], Tengku Muhammad Sahudra[2], Bunga Mulyahati[3]
[1,2,3] *Universitas Samudra, Indonesia*

ARTICLE INFO
Article history:
Received
12 Desember 2024
Revised
27 Desember 2024
Accepted
13 Januari 2024

ABSTRACT

This research focuses on creating a learning media product that utilizes Augmented Reality (AR) for teaching IPAS, particularly aimed at fifth-grade students in Social Studies. The study was conducted to evaluate the validation from experts in media, subject matter, and student testing, as well as to assess the practicality and effectiveness of student learning outcomes after engaging with the AR-based learning media. Utilizing a Research and Development (R&D) methodology, this study follows the ADDIE model, which includes five phases: Analysis, Design, Development, Implementation, and Evaluation. Data collection techniques used include observation, interviews, documentation, and validation questionnaires for experts, as well as response questionnaires for teachers and students.The validation results from media experts showed a percentage of 97.14% with a "highly feasible" criterion, material experts obtained a percentage of 92.5% with a "highly feasible" criterion, and test experts achieved 100% with a "highly feasible" criterion. The practicality results from teacher and student response questionnaires indicated that teachers gave a response percentage of 100% with a "highly practical" criterion, while students' responses reached 93.34% with a "highly practical" criterion. Furthermore, student learning outcomes were measured using Normality Test (N-Gain), resulting in a score of 73.58% with an "effective" criterion. Based on the assessment results, it can be concluded that the AR-based learning media for IPAS learning in fifth grade is highly feasible for use in education. Future researchers are advised to conduct field trials, measure the effectiveness of teaching materials, and further develop AR-based learning media for various subjects in elementary schools.

Keywords *Learning Media, Augmented Reality, Development.*

Corresponding Author : nadilanurachmadani@gmail.com

INTRODUCTION

Beginning of the Digital Revolution, or Industrial Revolution 4.0 is one of the global developments that encompasses all critical aspects of life. It has wide-

ranging impacts on various human activities, including the field of education (Anita et al., 2022).

A country's success in facing the Industrial Revolution 4.0 is inseparable from the quality of its human resources (HR). Humans can develop their abilities and create technology through effective use in educational processes. Education is a structured and practical effort aimed at advancing human knowledge (Fransyaigu et al., 2017). Essentially, education is a prerequisite for fostering creativity and critical thinking to develop human resources (Mahlianurrahman & Aprilia, 2022). Education is viewed as a proactive approach, as educational institutions aim to create a more promising future for the country. (Ayudia et al., 2021).

In the era of globalization, education is regarded as essential for enabling students to develop their potential and gain religious, personal, intellectual, and moral grounding. This aligns with the fundamental goal of education: to nurture students into individuals who are faithful, committed to God Almighty, virtuous in character, informed, healthy, imaginative, and self-reliant. (Ngongo et al., 2019). The digitalization of education activities in the era of globalization brings changes in areas such as school administration systems, school management, and teaching-learning processes, including assessment (Maisarah et al., 2023).

Learning is a process of behavioral change from ignorance to knowledge. It is a form of communication that occurs between teachers and students (Anggia et al., 2019). The teaching and learning process can only succeed if professionalism is consciously and seriously upheld throughout its execution. Teachers' actions directly influence learning outcomes. However, poor implementation of initial steps can lead to student dissatisfaction with the learning process (Sahudra & Juwita, 2018).

During the learning process, it is essential not only to explain the material but also to summarize the lessons and provide an overview of the next meeting's topics (Febri, 2022). Effective learning involves active student participation. Teachers must provide opportunities for students to analyze material more deeply (Putra, 2018). The teacher-student relationship significantly influences the quality of learning; positive interactions facilitate easier comprehension and mastery of materials (Asnawi et al., 2022).

In the learning process, students should be supported with digital learning tools to enhance their skills and foster independence (Kenedi et al., 2021). Several studies have harnessed digital media to optimize learning experiences and maximize the realization of educational goals (Maisarah et al., 2022). According to Sintawati et al. (2024), the development of digital media should

consider the demands of the fourth industrial revolution to ensure that elementary schools not only offer conceptual understanding but also provide students with practical technical skills.

Augmented Reality (AR) is a technology that integrates the real world with virtual elements in either two-dimensional or three-dimensional formats, displayed in real-time within a real-world environment (Alfitriani et al., 2021). In Indonesian, AR (Augmented Reality) refers to a technology that enhances the real world by integrating virtual objects, creating an interactive experience where the boundaries between reality and the virtual world seem seamless (Fransyaigu & Mulyahati, 2023). AR represents a shortcut and innovation in multimedia and image processing sectors, enabling 2D objects to appear as 3D, blending seamlessly with the surrounding environment (Ariftama, 2017). Given the growing demands on teachers to utilize technology during learning processes, especially in elementary schools, AR technology can support these efforts (Fransyaigu et al., 2024). This aligns with the notion that AR technology facilitates active student involvement in learning by allowing direct interaction with displayed digital elements. AR helps students understand abstract concepts by visualizing them concretely, enabling practical application of knowledge, problem-solving, solution design, and understanding of processes (Kenedi et al., 2023).

Digital learning media can enhance student learning outcomes and make teaching more manageable for educators. Learning outcomes reflect efforts to change individuals' behavior, encompassing cognitive, affective, and psychomotor abilities. Internal factors influencing learning outcomes include the students themselves, viewed from physical and psychological aspects. If a student’s physical health is impaired, their learning outcomes may fall short of expectations. Similarly, psychological issues, such as low intelligence or lack of interest in learning, can also impact outcomes. External factors influencing learning outcomes come from the student's environment (Ayudia, 2022). The relationships among students extend beyond the school environment; their connections and contributions also take place outside of school through communication, friendships, and involvement from parents and families. This facilitates the sharing of experiences and knowledge each others (Mulyahati et al., 2023).

Based on observations in Grade 5 at SD Negeri 5 Langsa, it was found that during science and social studies (IPAS) lessons, teachers rarely used engaging learning media. Teachers mainly read from textbooks and provided printed materials, leading to monotonous learning experiences. Observations also revealed that many students remained passive during lessons, sitting quietly

and merely listening without showing significant interest, such as asking questions, engaging in discussions, or being curious about the provided learning media. Only a few bright and interested students actively participated, resulting in overall low student engagement and poor learning outcomes. In contrast, when digital learning media were used, students showed enthusiasm and were more active, leading to improved learning outcomes.

To address this, the researcher believes in the need for media that supports student education by helping them understand the material. Beyond animated videos, students require more engaging tools, such as AR-based learning media. This media offers advantages like 3D visuals, simultaneous real and virtual visualizations, and the ability to captivate students' attention and curiosity, thus enhancing learning outcomes.

RESEARCH METHOD

This study utilizes the Research and Development (R&D) methodology, specifically focusing on a development research approach. The goal of development research is to create particular products and assess their effectiveness (Sugiyono, 2021). The methods employed in this study follow the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE model is widely recognized as one of the most commonly used research frameworks for the efficient and effective development of products. (Kenedi et al., 2018).

Methods for collecting data consist of observation, interviews, surveys, and record-keeping. Qualitative and quantitative analysis techniques are used to process the collected data. Qualitative analysis involves observations, teacher interviews, and feedback from validation experts. Quantitative analysis assesses data from questionnaires with a scale of 1-5 (Juliati et al., 2024). The feasibility and practicality of the AR learning media are measured using the following formula:

$$P = \frac{F}{N} x100\%$$

P: Final Score
F: Obtained Score
N: Maximum Score

The results are categorized into levels of practicality based on the following criteria:

Alacrity : Journal Of Education
Volume 5 Issue 1 February 2025
Page : 592-608

Table 1.
Percentage of Practicality Criteria

Score	Criteria
81%-100%	Highly Practical
61%-80%	Practical
41%-60%	Moderately Practical
21%-40%	Less Practical
0%-20%	Not Practical

Source: Sugiyono,2021

Quantitative data from student learning outcomes are analyzed using the N-Gain formula and percentage effectiveness (Wahab et al., 2021)

$$N\ Gain = \frac{Spostest - Spretest}{Smaks - Spretest}$$

Spost = Post-test score
Spre = Pre-test score
Smaks = Maximum score

N-Gain values are categorized as follows:

Table 2.
N-Gain Score Categories

N-Gain Score	Category
g > 0.7	High
0.3 ≤ g ≤ 0.7	Medium
g < 0.3	Low

Source: Wahab dkk,2021

The percentage effectiveness is classified as:

Table 3.
Percentage of Effectiveness Criteria

Percentage (%)	Criteria
80-100%	Highly Effective
60-80%	Effective
40-60%	Moderately Effective
20-40%	Less Effective
0-20%	Not Effective

Source: Wahab dkk,2021

Alacrity : Journal Of Education
Volume 5 Issue 1 February 2025
Page : 592-608

RESULT AND DISCUSSION

Analysis Stage

In the analysis phase, pre-research and research were conducted through observations in Grade 5 at SD Negeri 5 Langsa, involving 29 students. Informal interviews were held with a number of students and the homeroom teacher, Mrs. Ira Prisca, S.Pd.

1. Needs Analysis
   a) Student Needs Analysis

      Needs analysis is an activity conducted by researchers to identify the fundamental problems faced in the learning process, identify student characteristics, and formulate learning objectives to suit the product to be produced (Mulyahati & Fransyaigu, 2018). The results of the needs analysis based on observations conducted by the researcher found that the daily test scores of several students did not meet the Minimum Completeness Criteria (KKTP) with a fixed value of 80, resulting in 48.27% of students not meeting the minimum completeness criteria. This was evident during observations conducted by the researcher where several students were passive during science and social studies lessons. Students were observed to be more engaged in conversations with their seatmates, with only a few paying attention to the teacher at the front of the class. Consequently, some students failed to grasp the lesson. Additionally, the teaching materials used in the classroom were monotonous, often relying solely on YouTube videos or textbooks. However, the school's facilities were adequate and supportive of digital learning.

   b) Teacher Needs Analysis

      Observations and interviews with teachers at SDN 5 Langsa revealed that the use of teaching aids in science and social studies lessons was limited. Teachers often relied solely on YouTube videos or textbooks, with little variation in teaching methods. Although the school had adequate facilities for digital learning, teachers faced challenges in creating engaging and diverse learning materials, particularly for science subjects.

2. Curriculum Analysis

   Based on the interview activity with the homeroom teacher of class V, SD Negeri 5 Langsa has implemented the independent curriculum as a curriculum unit in the school. The material chosen is the IPAS material, namely Natural and Social Sciences (IPAS) with Learning Achievements

Table 4.
Learning Achievements and Objectives

Learning Achievements	Learning Objectives
Students will reflect on how changes in the Earth's surface occur due to natural and human factors, identify lifestyles that contribute to environmental problems, and predict the social, economic, and societal impacts of these problems.	1. Students are able to understand how the Earth's surface changes due to natural factors. 2. Students are able to identify the relationship between natural events and natural disasters. 3. Students are able to describe the impacts of natural disasters on human life.

Based on the stated learning outcomes and learning objectives, there is a need for learning media to facilitate teachers in delivering the learning materials. Teachers need to select and develop materials that align with the specified performance indicators under the Merdeka Curriculum to ensure that the learning materials support students in achieving these indicators (Ramadahani et al., 2022)

Design Stage

The second stage of this research was the design phase. In this phase, the researcher designed an Augmented Reality (AR)-based learning media to improve student learning outcomes. The target students were fifth-grade elementary school students, focusing on the topic of "Our Beloved Earth: Natural Phenomena and Disasters" from the Science subject. The steps involved in this phase were as follows:

1. **Preparation of Augmented Reality (AR) learning media framework.**

   The objects created by the researcher include floodwater, trees, houses, bird cages, mountains, and tornadoes. These objects were designed in 3D using Blender. After designing the objects, the researcher used Unity to transform these objects into Augmented Reality (AR) objects. To view these AR objects, the researcher also designed AR cards using Canva, which serve as instructions for using the AR media. Canva was also used to design the text and cover for the AR media. The storyboard for this AR media is as follows:

   a. Opening Section

   This section serves as the introduction to the Augmented Reality (AR)

learning media for Chapter 8, "Our Beloved Earth: Earth's Troubles", specifically Topic A: Why Does the Earth Change?

b. Augmented Reality (AR) media menu section
The menu section allows users to scan the marker provided on the AR card to trigger the appearance of 3D objects.

2. Preparation of Augmented Reality (AR) Media Assessment Instruments

To evaluate the Augmented Reality (AR) learning media, questionnaires were developed to assess product feasibility, practicality, and student interest. Experts in the subject matter, media, and item analysis provided feedback on the feasibility of the media. Teacher and student feedback, along with a post-test, were used to measure the practicality and effectiveness of the media in improving student learning outcomes.

Development Stage

The next stage in the ADDIE model is development. The goal of this stage is to produce a product that effectively represents students' understanding of the learning material (Sukirno & Aprilia, 2019). Before the Augmented Reality (AR) learning media could be tested on students, it was validated by experts: a media expert, a content expert, and a test item expert.

a. Media Validation

Validation was conducted by a media expert, Mr. Ronald Fransyaigu, S.Pd., M.Pd., who assessed aspects such as media efficiency, effectiveness, usability, maintainability, compatibility, creativity, simplicity, and overall appeal. The findings are outlined as follows:

Table 5.
Percentage of Media Validation

Phase	Percentage	Criteria
Phase I	52.85%	Fairly Feasible
Phase II	97.14%	Highly Feasible

Improvements were made after the first phase, resulting in a significant increase in Based on the table above, media validation was conducted in two stages. In the first validation, a percentage of 52.85% was obtained, categorized as fairly feasible, while in the second validation, a percentage of 97.14% was achieved, categorized as highly feasible.

b. Content Validation

Validation was performed by Mr. Dr. Asnawi, S.Pd., M.Pd., who

evaluated learning objectives, content accuracy, and benefits. The findings are outlined as follows:

Table 6.
Percentage of Content Validation

Phase	Percentage	Criteria
Phase I	72.5%	Feasible
Phase II	92.5%	Highly Feasible

Based on the table above, the content validation was carried out in two stages. In the first validation, a percentage of 72.5% was obtained, which falls into the "acceptable" category, while in the second validation, a percentage of 92.5% was obtained, which falls into the "very acceptable" category.

c. Test Item Validation

The student test items were validated by Mrs. Rapita Aprilia, S.Pd., M.Pd., focusing on question relevance, construction, and language use. The findings are outlined as follows:

Table 7.
Percentage of Test Item Validation

Phase	Percentage	Criteria
Phase I	78.18%	Feasible
Phase II	100%	Highly Feasible

Based on the table above, the validation of the student test questions was conducted in two stages. In the first validation, a percentage of 78.18% was obtained, which falls into the "acceptable" category, while in the second validation, a percentage of 100% was obtained, which falls into the "very acceptable" category.

Implementation Stage

The implementation phase is the fourth step in this research. During this phase, the media that has been validated and adjusted based on expert feedback will be utilized in a limited classroom trial. This trial aims to assess how practical the created media is in terms of student learning outcomes. To collect data pertaining to the practicality of the developed media and to evaluate its effect on student learning outcomes, information will be gathered through

questionnaires for both teachers and students, as well as through tests given to students during the trial.

1. Student Response Questionnaire

   The field trial phase took place after the product was modified based on the recommendations and input from experts. This trial was implemented on a small scale in a fifth-grade classroom at SD Negeri 5 Langsa.

Table 8.
Student Responses Percentage

No	Aspect	Aspect Skor	Max Score	Percentage	Criteria
1.	Learning Media	4,666	5	93,33	Very Practical
2.	Materials	4,656	5	93,13	Very Practical
3.	Benefits	4,679	5	93,58	Very Practical
Average		4,667		93,34	Very Practical

In terms of the learning media aspect, a score of 93.33% was achieved, qualifying as "very practical." Regarding the material aspect, a score of 93.13% was reached, also falling under the "very practical" category. For the benefits aspect, a percentage of 93.58% was recorded, which is again considered "very practical." The overall average percentage for all three aspects was 93.34%, which is categorized as "very practical."

2. Teacher Response Questionnaire

   In this development research, a practitioner, one of the fifth-grade teachers at SD Negeri 5 Langsa named Ira Prisca, S.Pd., was involved. In this questionnaire, the practitioner was required to fill out a questionnaire related to the feasibility of content, language, and material in the developed product.

Table 9.
Teacher Responses Percentage

No	Aspect	Total Score	Maks Score	Percentage	Criteria
1.	Content Feasibility	5	5	100%	Very Practical

2.	Language	5	5	100%	Very Practical
3.	Material	5	5	100%	Very Practical
Average		5	5	100%	Very Practical

The content feasibility aspect received a score of 100% based on the "very practical" criterion, while the language aspect also attained a 100% rating within the "very practical" category. Additionally, the material aspect achieved a 100% score using the "very practical" criterion. When averaging the percentages across all three aspects, the result was 100%, which is classified as "very practical."

Evaluation Stage

The evaluation phase represents the final stage in the ADDIE development model, during which an assessment is performed to ascertain the feasibility, practicality, and effectiveness of the augmented reality (AR) based learning media for fifth graders at SD Negeri 5 Langsa. At this phase, the media feasibility percentages are compiled from the validation questionnaires completed by media experts, material experts, and the student test questions, alongside the practicality percentages derived from the teacher and student response surveys, as well as the effectiveness percentage of student learning outcomes concerning the AR media from the test questions given to fifth-grade students. The percentages for the media feasibility are as follows:

Table 10.
Media Feasibility Percentage

No	Validator	Persentage	Criteria
1.	Media Expert	97,14%	Very Feasible
2.	Content Expert	92,5%	Very Feasible
3.	Test Item Expert	100%	Very Feasible
Average		96,54%	Very Feasible

The percentage for the media expert was 97.14% with the "very feasible" criterion, the material expert obtained a percentage of 92.5% with the "very feasible" criterion, and the test question expert obtained 100% with the "very feasible" criterion. Therefore, the average feasibility of the teaching materials developed by the researcher achieved a percentage of 96.54%, which is categorized as "very feasible" for use.

Table 11.
Media Practicality Percentage

No	Respons	Persentage	Criteria
1.	Teacher Response Questionnaire	100%	Very Practical
2.	Student Response Questionnaire	93,34%	Very Practical
Average		96,67%	Very Practical

The teacher response survey achieved a score of 100% under the "very practical" criterion, while the student response survey received a score of 93.34% in the same category. The overall practicality of the learning media created by the researcher was assessed at 96.67%, placing it in the "very practical" classification.

Improvement in Student Learning Outcomes After Using AR Media

Assessing the improvement in student learning outcomes following the use of Augmented Reality (AR) instructional materials is one of the study's goals. Therefore, to measure the extent of the improvement in student learning outcomes, the researcher used test questions that had been previously validated. These test questions were then given to the fifth-grade students at SD Negeri 5 Langsa before and after learning using Augmented Reality (AR) learning media.

To evaluate the improvement in student learning outcomes prior to and following the use of AR-based learning media, the N-Gain test was used to examine data from the pretest and posttest scores. The percentage of student learning outcomes and N-Gain scores before and after utilizing the AR-based learning materials are shown in the following table:

Table 12.
Effectiveness Percentage of Student Learning Outcomes

No	Student Name	Pretest	Posttest	Post-Pre	100-Pretest	N-Gain Score	N-Gain (%)
1	RI	73	87	14	27	0.51	51.85
2	AQ	66	87	21	34	0.61	61.76
3	NA	33	73	40	67	0.59	59.70
4	ML	47	80	33	53	0.62	62.26
5	ZA	40	67	27	60	0.45	45

6	SP	53	87	34	47	0.72	72.34
7	MG	60	93	33	40	0.82	82.5
8	ZF	67	100	33	33	1	100
9	QA	87	100	13	13	1	100
10	SSA	53	73	20	47	0.42	42.55
11	RP	67	87	20	33	0.60	60.60
12	MR	80	100	20	20	1	100
13	AP	80	100	20	20	1	100
14	HZ	47	80	33	53	0.62	62.26
15	SS	73	93	20	27	0.74	74.07
16	TM	67	87	20	33	0.60	60.60
17	TS	87	100	13	13	1	100
18	AD	80	100	20	20	1	100
19	AS	93	100	7	7	1	100
20	KA	87	100	13	13	1	100
21	AP	73	87	14	27	0.51	51.85
22	KA	47	87	40	53	0.75	75.47
23	SAA	53	73	20	47	0.42	42.55
24	DSF	66	93	27	34	0.79	79.41
25	PHK	80	100	20	20	1	100
26	MAN	73	87	14	27	0.51.	51.85
27	SK	60	80	20	40	0.5	50
Average		66.37	88.92	22.55	33.62	**0.73**	**73.58**

The N-Gain exam, which measures gains in student interest in learning, yielded an average score of 0.73, falling into the "high" range. As a result, it can be said that the researcher's Augmented Reality (AR) learning materials are successful in raising student learning outcomes because they satisfy the effectiveness criteria with a 73.58% rating, which is classified as "effective."

CONCLUSION

The research and development in this study led to the following conclusions:

1. The development in this study used the ADDIE model, with the first stage being the analysis stage, which involved analyzing the needs of the teacher, the students, and the curriculum. The teacher and student needs were obtained from interviews and observations, while the curriculum analysis was obtained through interviews. The second stage is the design stage,

where a storyboard was created, and appropriate references for the material and media were selected. The third stage is the development stage, which continues the process from the previous product creation by validating the product with media experts, material experts, and test question experts. The fourth stage is the implementation stage, where the media is distributed, and questionnaires for teacher responses, student responses, and student test questions are distributed to assess the effectiveness of the media on student learning outcomes. The final stage is the evaluation stage, which summarizes the entire development process conducted in this research.

2. The feasibility of the Augmented Reality (AR) learning media was determined based on the feasibility assessment by one media expert, one material expert, and one test question expert. (a) The feasibility assessment by the media expert resulted in a score of 97.14% with the "very feasible" criterion. (b) The feasibility assessment by the material expert resulted in a score of 92.5% with the "very feasible" criterion. (c) The feasibility assessment by the test question expert resulted in a score of 100% with the "very feasible" criterion.
3. The practicality of the media: (a) The teacher's response to the Augmented Reality (AR) learning media resulted in a score of 100% with the "very practical" criterion. (b) The fifth-grade students' response at SD Negeri 5 Langsa to the Augmented Reality (AR) learning media resulted in a score of 93.34% with the "very practical" criterion.

The improvement in student learning outcomes after using the Augmented Reality (AR) learning media, when presented in percentages, was 73.58%. Therefore, It may be inferred that the researcher's Augmented Reality (AR) learning materials can enhance students' learning results in IPAS Chapter 8 "My Beloved Earth, My Earth is Sad": Topic A, "Why does the Earth change?"

REFERENCES

Alfitriani, Nabila, Wisheila Ayunisa Maula, and Angga Hadiapurwa. 2021. "Penggunaan Media Augmented Reality Dalam Pembelajaran Mengenal Bentuk Rupa Bumi." *Jurnal Penelitian Pendidikan* 38(1):30–38. doi: 10.15294/jpp.v38i1.30698.

Anggia, D., Asnawi, & Juliati. (2019). Kehidupan " SD Negeri 7 Langsa Pengaruh Model Pembelajaran Make A Match Terhadap Hasil Belajar Siswa pada Tema 7 " Peristiwa dalam a. *Journal of Basic Education Studies*, *2*(1), 57–67.

Anita, Y., Arwin, A., Ahmad, S., Helsa, Y., & Kenedi, A. K. (2022). Pelatihan Pengembangan Bahan Ajar Digital Berbasis HOTS Sebagai Bentuk

Pembelajaran Di Era Revolusi Industri 4.0 Untuk Guru Sekolah Dasar. *Dedication : Jurnal Pengabdian Masyarakat*, *6*(1), 59–68. https://doi.org/10.31537/dedication.v6i1.658

Aprilia, R., & Sukirno. (2019). Efektivitas Penggunaan Buku Ajar IPS Berbasis Sejarah Lokal Melalui Pendekatan Lingkungan Di Kelas IV SD Kecamatan Ketol Kabupaten Aceh Tengah. *Jurnal Ilmu-Ilmu Sejarah, Sosial, Budaya Dan Kependidikan*, *6*(2), 178–190.

Ariftama, Budi. (2017). Panduan Mudah Membuat Augmented Reality. Yogyakarta: CV. Andi Offset.

Asnawi, Jamil, T. M., Fransyaigu, R., & Mulyahati, B. (2017). Analisis Penerapan Pendekatan Saintifik pada Pembelajaran PKn untuk Meningkatkan Kecakapan Kewarganegaraan Siswa SD. *Prosiding Seminar Pascasarja (SNP) Unsyiah*, 64–69.

Ayudia, I. (2022). Penerapan Metode Bercerita Dalam Meningkatkan Hasil Belajar Ilmu Pengetahuan Sosial (Ips) Siswa Kelas V Sdn 3 Langsa Aceh. *Dirasatul Ibtidaiyah*, *2*(1), 84–96. https://doi.org/10.24952/ibtidaiyah.v2i1.5623

Ayudia, I., Haqqi, A., & Munthe, S. T. (2021). Penerapan Pembelajaran Sejarah dalam Penanaman Nilai Karakter Religius dan Nasionalisme di MA Negeri 1 Aceh Tengah. *TA'BID: Jurnal Pemikiran Pendidikan*, *11*(2).

Fransyaigu, R., Ayudia, I., Arpilia, R., Mulyahati, B., & Kiswanto, A. (2024). Inovasi Media Augmented Reality Dalam Mengoptimalkan Pendidikan Inklusi Di Sekolah Dasar. *JAHE: Journal Of Human And Education. 4*(5), 878–885.

Fransyaigu, R., Mulyahati, B., & Jamil ,T. (2017).Analisis Penerapan Pendekatan Saintifik Pada Pembelajaran PKN Untuk Meningkatkan Kecakapan Kewarganegaraan Siswa SD. *In Prosiding Seminar Nasional Pascasarjana Unsyiah*

Fransyaigu, R., Mulyahati, B. (2023). Gerakan Bengkel Literasi Melalui Pendampingan Pembuatan E-Pop Up Bagi Guru Sekolah Dasar. *Community Development Journal, 4*(1), 413-417.

Juliati, Dewi, I.P, Fransyaigu, R. (2024). Pengembangan Media Pembelajaran Berbasis Augmented Reality Untuk Membantu Membaca Pemahaman Kelas IV SD Negeri 1 Langsa. *Pendas*: *Jurnal Ilmiah Pendidikan Dasar*. *24*(7), 28–42.

Ngongo, V. L., Hidayat, T., Wiyanto. (2019). Pendidikan Di Era Digital. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas PGRI Palembang*, 628–638. https://doi.org/10.1515/9781400866137

Kenedi, A. K., Akmal, A. U., Handrianto, C., & Sugito. (2023). The Effect of

using Virtual Reality Media on the Geometric Skills of Elementary School Students. *JPI (Jurnal Pendidikan Indonesia)*, *12*(3), 427–435. https://doi.org/10.23887/jpiundiksha.v12i3.60735

Kenedi, A. K., Helsa, Y., & Hendri, S. (2018). Pengembangan Bahan Ajar Matematika Berbasis Alquran Di Sekolah Dasar. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, *2*(1), 29–36. https://doi.org/10.24036/jippsd.v2i1.100034

Kiswanto Kenedi, A., Salido, A., & Ayu Agustiana Putri, D. (2023). *the Influence of the Use of Augmented Reality Media on the Stem Literacy of Primary School Students*. *1*, 335–345.

Mahlianurrahman, M. (2017). Pengembangan Perangkat Pembelajaran untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa Sekolah Dasar. *AR-RIAYAH : Jurnal Pendidikan Dasar*, *1*(1), 87. https://doi.org/10.29240/jpd.v1i1.219

Mahlianurrahman, M., & Aprilia, R. (2022). Pengembangan Media Video Untuk Meningkatkan Literasi Sains Siswa Sekolah Dasar. *Dikoda: Jurnal Pendidikan Sekolah Dasar*, *3*(01), 8–17. https://doi.org/10.37366/jpgsd.v3i01.1060

Maisarah, Ayudia, I., Prasetya, C., & Mulyani. (2023). Analisis Kebutuhan Media Digital Pada Pembelajaran IPA di Sekolah Dasar. *Jurnal Pengajaran Sekolah Dasar*, *2*(1), 48–59. https://doi.org/10.56855/jpsd.v2i1.314

Maisarah, M., Lestari, T. A., & Sakulpimolrat, S. (2022). Urgensi Pengembangan Media berbasis Digital Pada Pembelajaran Bahasa Indonesia. *EUNOIA (Jurnal Pendidikan Bahasa Indonesia)*, *2*(1), 65. https://doi.org/10.30821/eunoia.v2i1.1348

Mulyahati, B. ., Fransyaigu, R., Ramadhani, D. ., & Aprilia, R. (2023). "Guree Inklusi" sebagai Sarana Berbagi Praktik Baik Guru-Guru Inklusi di Kota Langsa. *Journal Of Human And Education (JAHE)*, *3*(3), 54–61. https://doi.org/10.31004/jh.v3i3.320

Mulyahati, B., & Fransyaigu, R. (2018). Desain Inkuiri Moral Dalam Pembentukan Karakter Nasionalis Siswa Sd. *DWIJA CENDEKIA: Jurnal Riset Pedagogik*, *2*(2), 10. https://doi.org/10.20961/jdc.v2i2.25644

Putra, A. (2018). Pengaruh Metode Pembelajaran Terhadap Hasil Belajar IPS Siswa Kelas IV Sekolah Dasar. *Seuneubok Lada: Jurnal Ilmu-Ilmu Sejarah, Sosial, Budaya Dan Kependidikan*, *5*(1), 68–74.

Putra, A. (2024). Pengembangan Media Pembelajaran E-Comik Untuk Siswa Sekolah Dasar. *E-Jurnal Skripsi Program Studi Teknologi Pendidikan*, *7*(3), 304–310. https://mail.ejurnalunsam.id/index.php/jbes/article/view/9947

Rafli, M. F. (2022). Analisis Pelaksanaan Pembelajaran Matematika Di SD Negeri 101868 Batang Kuis. *Journal of Basic Education Studies*, *5*(1), 166–172.

Ramadhani, D., Kenedi, A. K., Rafli, M. F., Harahap, H., Banjar Negara, V. M. A., Hayati, R., & Akmal, A. U. (2023). Pelatihan Implementasi Proyek Penguatan Profil Pelajar Pancasila bagi Guru Sekolah Dasar. *Majalah Ilmiah UPI YPTK*, *30*, 9–12. https://doi.org/10.35134/jmi.v30i1.133

Sahudra, & Juwita. (2018). Pengaruh Sikap Berkomunikasi Dan Profesinalisme Guru Serta Disiplin Terhadap Prestasi Belajar Siswa Di Sekolah Menengah Pertama Negeri 1 Kota Langsa. *Seuneubok Lada: Jurnal Ilmu-Ilmu Sejarah, Sosial, Budaya Dan Kependidikan*, *Vol. 5*(N. 1), 129–137. http://jurnal.unsam.ac.id/index.php/jsnbl/article/view/875%0Ahttp://jurnal.unsam.ac.id/index.php/jsnbl/article/download/875/715

Sugiyono. (2021). Metode Penelitian Kuantitatif, Kualitatif, Dan R&D. Bandung: Alfabeta

Wahab, A., Junaedi, J., & Azhar, M. (2021). Efektivitas Pembelajaran Statistika Pendidikan Menggunakan Uji Peningkatan N-Gain di PGMI. *Jurnal Basicedu*, *5*(2), 1039–1045. https://doi.org/10.31004/basicedu.v5i2.845