Jurnal Pedagogik Pendidikan Dasar

Journal homepage: *https://ejournal.upi.edu/index.php/jppd/index*

Development of AR Book Learning Media Based on Assembler Edu to Improve Learning Outcomes on the Utilization of Biological Natural Resources Material

Sri Hasna Huwaida Fahriyah[1*], Wawan Syahiril Anwar[2], Fitri Anjaswuri[3]

[1,2,3]Universitas Pakuan, Bogor
Correspondence E-mail: hasnafahriyah01@gmail.com

ABSTRACT

Social studies learning in elementary schools is currently still dominated by lecture methods and minimal innovative media, so that the motivation and completeness of students' learning outcomes are low. This study aims to design, test the feasibility, and measure the effectiveness of Assemblr Edu-based AR Book learning media on the Utilization of Biological Natural Resources material to improve student learning outcomes. The research method used is Research and Development (R&D) with the ADDIE development model. The research subjects involved validation experts and 27 students of class V-C SD Negeri Cicadas 01 Bogor Regency. Data collection instruments include expert validation sheets, teacher and student response questionnaires, and learning outcome tests in the form of pre-tests and post-tests. The results of the study show that Assemblr Edu-based AR Book media is very feasible to use, as evidenced by the validation of media experts of 97%, linguists of 91%, and material experts of 84% in the category of "very feasible". This media also received a very positive response from teachers of 100% and students of 92%. In addition, there was an increase in learning outcomes from the pre-test average of 37 to 85 in the post-test, with an average N-Gain score of 0.78 which was included in the high category. Thus, the AR Book learning media based on Assemblr Edu on the material on the use of biological natural resources was declared to be very feasible and effective to be used to improve the learning outcomes of elementary school students.

© 2026 Jurnal Pedagogik Pendidikan Dasar

ARTICLEINFO

Article History:
Submitted 01 Jul 2026
First Revised 07 Sep 2026
Accepted 19 Sep 2026
First Available online 15 Oct 2026
Publication Date 01 Nov 2026

Keyword:
AR Book, Assemblr Edu, Learning outcomes, IPAS, Utilization of Biological Resources

1. INTRODUCTION

The development of 21st-century education is oriented toward the development of human potential. The quality of education is one of the important indicators of a country's development because human resources play a central role in responding to the challenges of globalization. Education is dynamic and continues to develop in line with advances in science, technology, and information. Technological developments have made the learning process more accessible and practical by providing diverse sources of information and opportunities for innovation. In 21st-century education, technology has become an important component of learning, enabling teachers to utilize digital tools and innovative learning media to create more engaging and interactive classroom environments (Azzahra & Prasetio, 2024; Fauziyyah, Fitriani, & Giwangsa, 2025).

Education in Indonesia continues to evolve through curriculum changes that adapt to the needs and circumstances of students, making learning more flexible and providing space for educators to tailor the learning process to the characteristics, needs, and potential of students (Nabila et al., 2024). Therefore, the introduction of the Merdeka Curriculum serves as a response to the ever-evolving needs of education by creating a learning environment that is more flexible and student-centered, thereby giving educators the freedom to adapt the learning process, methods, and activities to the characteristics, needs, and potential of each student.

The subject of Natural and Social Sciences (IPAS) integrates scientific and social concepts within the Merdeka Curriculum. At the elementary school level, the topic of the utilization of biological natural resources is important because it introduces students to the relationship between the use of flora and fauna and environmental conservation. This topic emphasizes sustainability through an interdisciplinary learning approach. Students are expected to identify various threats to biological diversity, such as deforestation, illegal wildlife hunting, and climate change, while also understanding simple conservation efforts. However, the implementation of IPAS learning may still face limitations in the availability and variety of learning media and learning facilities. These limitations can reduce students' opportunities to experience meaningful and contextual learning. Consequently, learning activities that should provide students with opportunities to observe, explore, and understand concrete objects may become less optimal (Hidayat, 2024).

Based on observations and interviews conducted at SD Negeri Cicadas 01 on October 23, 2025, the implementation of IPAS learning in class V was still dominated by the lecture method. The learning media used were relatively concrete but less varied, including posters and maps displayed on classroom walls. The utilization of technology to develop creative, interactive, and innovative learning media was also still limited. These conditions affected student engagement during the learning process. Some students were easily distracted by their classmates and paid less attention to the teacher's explanations, which resulted in difficulties in understanding the learning material. The findings indicate the need for learning media that can increase student engagement and provide a more attractive learning experience.

One alternative to address these conditions is the development of digital-based learning media using Augmented Reality (AR). AR can combine digital objects with the real-world environment, allowing abstract or two-dimensional information to be presented in a more concrete three-dimensional form (Awignamatu, et al., 2024). In this research, AR is integrated into an AR Book developed using Assemblr Edu (Khaliq, 2020). The AR Book is designed in the form of a textbook containing learning materials and two-dimensional visual information, with a barcode on each relevant page that can be scanned using a digital device to display three-dimensional objects and audio. Assemblr Edu is utilized to create and visualize three-

dimensional learning objects through AR. This combination provides students with opportunities to observe learning objects in a more concrete and interactive manner.

The development of AR Book in this research has several differences from previous studies. Safira et al. (2022) developed an AR-based textbook using the Assemblr application on the theme of exploring outer space for sixth-grade elementary school students, with the learning context and content focusing on outer-space exploration. Meanwhile, Surtiningtiyas (2024) developed AR teaching materials using Assemblr on the water cycle material. The present research differs from these studies in terms of the learning material, product focus, and learning outcomes measured. This study develops an AR Book based on Assemblr Edu specifically for the utilization of biological natural resources material for fifth-grade elementary school students. The product does not merely present AR-based teaching materials but is designed as a textbook integrated with barcode-based three-dimensional visualizations and audio to support students in understanding biological natural resources in a more concrete and contextual manner. In addition, this research evaluates the feasibility of the product through media, language, and material expert validation, examines teacher and student responses, and measures its potential to improve student learning outcomes through pre-test and post-test results. Therefore, this research complements previous AR-based learning media studies by applying Assemblr Edu to a different IPAS topic and combining product feasibility, user responses, and learning outcome measurements within the development process.

The development of this learning media is expected to assist teachers in providing more varied learning experiences while helping students understand the utilization of biological natural resources through three-dimensional visualization and audio (Khalil, 2025). The use of AR Book also provides students with an opportunity to become familiar with the application of technology in learning. Through a more interactive and contextual learning experience, students are expected to become more engaged in the learning process and obtain meaningful learning experiences.

Previous research conducted by Safira et al. (2022), entitled "Development of Augmented Reality (AR) Based Textbooks Using Assemblr Apps on the Theme of Exploring Outer Space for 6th Grade Elementary School," demonstrated that AR-based textbook development using Assemblr was valid and effective in supporting elementary students' understanding. Similarly, Prabowo & Wakhudin (2024), through research entitled "Development of Augmented Reality Teaching Materials with Assemblr on the Water Cycle Material," reported that Assemblr-based AR teaching materials were suitable for implementation in learning. These studies provide a foundation for the development of AR-based learning media while also indicating an opportunity to apply the technology to other IPAS materials, particularly the utilization of biological natural resources for fifth-grade elementary school students.

Therefore, this study aims to develop an Augmented Reality (AR) Book based on Assemblr Edu for the utilization of biological natural resources material for fifth-grade elementary school students, determine the feasibility of the developed media based on media, language, and material expert validation, identify teacher and student responses to the developed media, and determine its effectiveness in improving student learning outcomes.

2. RESEARCH METHODOLOGY

This research employed a Research and Development (R&D) method to develop an Augmented Reality (AR) Book based on Assemblr Edu for the IPAS subject on the topic of "Utilization of Biological Natural Resources." The Research and Development method is used to produce new products or develop existing products and test their feasibility and effectiveness

(Ariska & Laksono, 2023). The development procedure used the ADDIE model, which consists of five stages: Analyze, Design, Develop, Implement, and Evaluate (Harefa, et al., 2023) The application of the ADDIE model in the development of digital-based learning is considered capable of supporting the effectiveness of learning (Damanik, et al., 2024). The research was conducted at SD Negeri Cicadas 01, Ciampea District, Bogor Regency, involving 27 fifth-grade students of class V-C and one fifth-grade teacher as respondents. Product validation involved three experts consisting of a media expert, a material expert, and a language expert. The research instruments consisted of expert validation sheets, teacher and student response questionnaires using a four-point Likert scale, and learning outcome tests administered as pre-test and post-test. The feasibility and response data were analyzed using the percentage formula $P = (\Sigma x/\Sigma xi) \times 100\%$, where P is the percentage obtained, Σx is the total score obtained, and Σxi is the maximum score, with the criteria of 81–100% = very feasible, 61–80% = feasible, 41–60% = fairly feasible, 21–40% = less feasible, and 0–20% = not feasible. The improvement in student learning outcomes was analyzed using the normalized gain (N-Gain) formula g = (post-test score − pre-test score)/(maximum score − pre-test score), with the criteria of $g \geq 0.70$ = high, $0.30 \leq g < 0.70$ = medium, and $g < 0.30$ = low. The data were then analyzed descriptively to determine the feasibility of the AR Book, teacher and student responses, and the improvement in student learning outcomes after the implementation of the developed learning media.

3. RESULT AND DISCUSSION

3.1. *Analysis*

The analysis stage was conducted to identify the needs and problems encountered in IPAS learning at SD Negeri Cicadas 01. Based on observations and interviews, the learning process in grade V was still dominated by textbooks and lecture-based instruction, while the use of digital technology and interactive learning media had not been optimized. Students tended to lose focus and become less motivated when learning activities were presented monotonously. However, the availability of facilities such as projectors and internet access provided an opportunity to develop more innovative learning media. The students also showed greater interest in varied learning activities supported by digital technology. Based on these findings, the researchers identified the need for learning media that could provide more concrete and engaging visualization of the learning material. Therefore, an Augmented Reality (AR) Book based on Assemblr Edu was developed for the topic of Utilization of Biological Natural Resources to provide students with interactive three-dimensional visualizations and audio that could support their understanding of the material.

3.2. *Design*

The design stage focused on developing the structure and visual concept of the AR Book based on the results of the needs analysis. The AR Book was designed as a textbook containing learning materials on the utilization of biological natural resources and was integrated with Augmented Reality technology. Selected pages were equipped with markers that could be scanned using a digital device to display three-dimensional objects and supporting audio. The 3D objects were selected and arranged according to the learning content to provide students with more concrete and interactive representations of biological natural resources. The design also considered the characteristics of elementary school students by presenting simple text, attractive visual elements, and interactive content.

Table 1. Design of AR Book Learning Media Based on Assemblr Edu

Design Component	Description
AR Book	A textbook containing learning materials on the utilization of biological natural resources.
Marker/Barcode	A marker placed on selected pages and used to access AR content through a digital device.
3D Objects	Three-dimensional visualizations related to the learning material, designed using Assemblr Edu.
Audio	Audio explanations integrated into the AR content to provide additional information and support students' understanding.
Learning Content	Material related to the utilization of biological natural resources presented through text, images, 3D objects, and audio.



Figure 1. Final 3D AR Visualization



Figure 2. AR Book Page with Marker



Figure 3. 3D AR Object Visualization

3.3. *Development*

The development stage involved producing the AR Book based on the design that had been prepared and subsequently conducting expert validation to determine the feasibility of the developed product. The validation covered three aspects, namely media, language, and material. The results showed that the AR Book obtained a percentage of 97% from the media expert, 91% from the language expert, and 84% from the material expert. All validation results were categorized as very feasible. The validation results indicate that the developed AR Book met the feasibility requirements in terms of visual design, language, and suitability of the learning material and could therefore be continued to the implementation stage.

Table 2. Results of Expert Validation of the AR Book

No.	Validator	Percentage	Criteria
1	Media Expert	97%	Very Feasible
2	Language Expert	91%	Very Feasible
3	Material Expert	84%	Very Feasible

3.4. *Implementation*

Tabel 3. Calculation Results *N-Gain Pretest* and *Posttest*

Criteria	Pretest	Posttest
Number of Students	27	27
Highest Score	65	100
Lowest Score	15	70
Average Score	37	85
Average N-Gain	**0,78**	
Explanation	**High**	

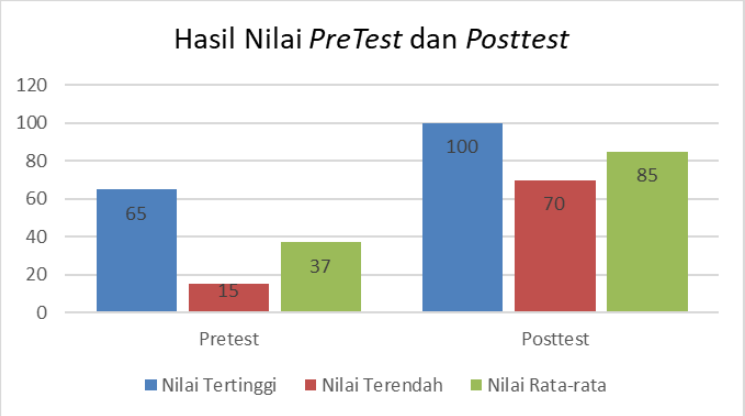


Figure 4. Grade Tabulation *Pretest* and *Posttest*

The implementation stage was conducted through a trial of the developed AR Book with 27 fifth-grade students of class V-C at SD Negeri Cicadas 01. Students completed a pre-test before using the AR Book and a post-test after participating in learning activities using the developed media. The pre-test results showed a highest score of 65, a lowest score of 15, and an average score of 37. After the implementation of the AR Book, the post-test results showed

a highest score of 100, a lowest score of 70, and an average score of 85. The average N-Gain score was 0.78, which was categorized as high. These results indicate an increase in students' learning outcomes after the implementation of the AR Book based on Assemblr Edu.

3.5. *Evaluation*

The evaluation stage was conducted by collecting teacher and student responses after the implementation of the AR Book. The teacher response questionnaire assessed the content and quality of the learning media, while the student response questionnaire assessed the use of the learning media, students' reactions to its use, and supporting facilities. The teacher response obtained a percentage of 100%, while the student response obtained an average percentage of 92%. Both results were categorized as very feasible. These findings indicate that the AR Book based on Assemblr Edu received positive responses from both teachers and students and was considered suitable for supporting the IPAS learning process.

Table 4. Teacher and Student Responses to the AR Book

Respondent	Percentage	Criteria
Teacher	100%	Very Feasible
Students	92%	Very Feasible

3.6. Discussion

The development of the AR Book based on Assemblr Edu was motivated by the need for more engaging and interactive learning media in IPAS learning. The needs analysis showed that learning activities were still largely dependent on textbooks and conventional teaching methods, while the use of digital technology had not been optimized (Abdillah & Wulandari, 2024; Erfan, et, al., 2024). The developed AR Book provides an alternative by combining textbook content with Augmented Reality technology, allowing students to access three-dimensional objects and audio through markers placed on selected pages. This feature provides a different learning experience from conventional textbooks because students are not only reading descriptions or observing two-dimensional images but can also observe learning objects in a more concrete and interactive form (Basiroen, et al., 2022).

The use of three-dimensional visualization is particularly relevant to elementary school learning because students can benefit from concrete representations when understanding concepts that are difficult to observe directly. In the topic of Utilization of Biological Natural Resources, several objects and phenomena may be difficult for students to observe directly in the classroom. The AR Book addresses this limitation by presenting related objects through three-dimensional visualization that can be viewed using digital devices. The integration of audio also provides additional explanations that can support students in connecting visual information with the learning content (Fajriati, 2024). Thus, the media can provide a more meaningful learning experience by combining textual, visual, auditory, and interactive elements.

The feasibility validation results support the suitability of the developed product for learning. The AR Book obtained a score of 97% from the media expert, 91% from the language expert, and 84% from the material expert, all of which were categorized as very feasible. These results indicate that the product met the required aspects of media presentation, language, and learning content. The positive responses from the teacher and students, which reached 100% and 92%, respectively, further indicate that the media was well received by users. The combination of feasible content and positive user responses suggests that the AR Book can be implemented as an alternative learning medium for IPAS.

The improvement in student learning outcomes provides further evidence of the potential contribution of the developed media. The average student score increased from 37 on the pre-test to 85 on the post-test, with an average N-Gain of 0.78, categorized as high. This improvement can be explained by the ability of AR Book to provide concrete and interactive representations of the learning material. The visualization of three-dimensional objects can help students form clearer mental representations of concepts that are difficult to understand through text or static images alone. The interactive nature of AR can also encourage students to pay greater attention to the learning material and actively explore the objects presented. In addition, the integration of audio provides another form of information that can reinforce the visual content. The combination of these elements can reduce the monotonous nature of learning and support students in maintaining attention during the learning process.

The findings are consistent with previous research by Safira et al. (2022), which developed an AR-based textbook using Assemblr for sixth-grade students on the theme of exploring outer space. The study demonstrated the potential of Assemblr-based AR textbooks to support students' understanding through three-dimensional visualization. However, the present study differs in its learning context and material, as it focuses on the Utilization of Biological Natural Resources for fifth-grade students. The findings are also relevant to the research of Hapsari & Wulandari (2020), which developed AR teaching materials using Assemblr for the water cycle material. The present study extends the application of Assemblr-based AR learning media to another IPAS topic and combines AR Book development with expert validation, teacher and student responses, and measurement of learning outcome improvement.

Despite its positive results, the implementation of the AR Book encountered several limitations. Students were not permitted to bring personal devices to school, requiring the researcher to provide devices for accessing the AR content. In addition, the school's Wi-Fi connection was sometimes unstable, which could affect the accessibility of the AR content during learning activities. Nevertheless, the AR Book offers several advantages, including the ability to provide three-dimensional visualization, supporting audio, and interactive learning experiences that can be accessed as a learning aid beyond conventional textbook use.

4. CONCLUSION

The AR Book based on Assemblr Edu was successfully developed using the ADDIE model, consisting of the stages of Analyze, Design, Develop, Implement, and Evaluate. The developed product integrates textbook content with Augmented Reality technology that enables students to access three-dimensional objects and audio interactively. The product was categorized as very feasible based on the validation results, with scores of 97% from the media expert, 91% from the language expert, and 84% from the material expert. The teacher and student responses were also positive, with percentages of 100% and 92%, respectively. Furthermore, the AR Book demonstrated potential in improving student learning outcomes, as indicated by an increase in the average score from 37 on the pre-test to 85 on the post-test and an average N-Gain score of 0.78, which was categorized as high. Therefore, the AR Book based on Assemblr Edu can be used as an alternative interactive learning medium for the topic of Utilization of Biological Natural Resources in elementary school.

5. REFERENCE

Abdilah, D., & Wulandari, D. (2024). Development of Augmented Reality Book (AR-Book) Based Science Learning Media on Human Digestive System Material to Improve Student

Learning Outcomes. Jurnal Penelitian Pendidikan IPA, 10(7), 4235–4245. https://doi.org/10.29303/jppipa.v10i7.7312

Ahmad, Saputran E, E., & Suziman, A. (2025). Integrasi Pendekatan Teori Belajar Konstruktivisme Melalui Model Project-Based Learning pada Pembelajaran Ips di Sekolah Dasar. Sulawesi Tenggara Educational Journal, 5(1), 469–475.

Ariska, N. N., & Laksono, P. J. (2023). Pengembangan E-Book Kimia Berbasis Augmented Reality (AR) pada Materi Bentuk Molekul. Orbital: Jurnal Pendidikan Kimia, 7(2), 197–207.

Awignamatu, P., Ritayanti, P., & Karsono. (2024). Penggunaan aplikasi Assemblr Edu untuk meningkatkan motivasi belajar IPAS peserta didik kelas IV sekolah dasar. Didaktika Dwija Indria, 12(4), 256–262.

Azzahra, S., & Prasetyo, T. (2024). Penggunaan Media Pembelajaran Digital dalam Meningkatkan Motivasi Belajar Siswa berdasarkan Perspektif Guru. Jurnal Inovasi Pendidikan Sekolah Dasar, 1(2), 120–134.

Basiroen, V. J., Permatasakti, D., & Paath, R. E. (2022). Interactive AR Book As Media For Educating Children About Colorism in Jakarta. Ultimart: Jurnal Komunikasi Visual, 15(2), 173–185. https://doi.org/10.31937/ultimart.v15i2.2775

Cahyan, T. S. (2023). Studi Literatur Pemanfaatan Media Pembelajaran Ipas Menggunakan Aplikasi Assemblr Edu Di Sekolah Dasar. Jurnal Inovasi Teknologi Dan Edukasi Teknik, 3(9), 2. https://doi.org/10.17977/um068.v3.i9.2023.2

Chairudin, M., Nurhanifa, Yustianingsih, T., Aidah, Z., Atoillah, & Hadi, M. S. (2023). Sebagai Media Pembelajaran Matematika Jenjang Smp / Mts. Communnity Development Journal, 4(2), 1312–1319.

Damanik, S. A., Silaban, R., & Nurfajriani. (2024). Pengembangan Media Mobile Augmented Reality (AR) untuk Siswa Kelas XII SMA pada Materi Senyawa Turunan Alkana. Didaktika: Jurnal Kependidikan, 13(2), 2203–2216. https://ssed.or.id/contents/article/view/735%0Ahttps://ssed.or.id/contents/article/download/735/452

Erfan, M., Istiningsih, S., Dewi, N. K., Darmiany, D., & Karma, I. N. (2024). Pelatihan Penggunaan Platform Assemblr Edu Bagi Guru Dan Peserta Didik Di Sdn 7 Mataram. Jurnal Warta Desa (JWD), 6(1), 38–44. https://doi.org/10.29303/jwd.v6i1.294

Fajriati, R. (2023). Penggunaan Buku Aktivitas Anak berbasis Augmented Reality (AR) pada Buku Digital Cerdas Indonesia 2. Jumat Keagamaan: Jurnal Pengabdian Masyarakat, 4(2), 60–63. https://doi.org/10.32764/abdimasagama.v4i2.3854

Fauziyyah, A., Fitriani, A. D., & Giwangsa, S. F. (2025). Efektivitas Penggunaan Media Kirana Dalam Meningkatkan Pemahaman Konsep Materi Keberagaman Budaya Pada Siswa Kelas IV SD. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *10*(03), 230-245.

Hakim, R. L., & Nurjanah, N. (2020). Media Aplikasi Berbasis Augmented Reality Untuk Pengenalan Budaya. Seminar Internasional Riksa …, 748–755. http://proceedings2.upi.edu/index.php/riksabahasa/article/view/1417

Hapsari, T. P. R. N., & Wulandari, A. (2020). Analisis Kelayakan Buku Ajar Milenial Berbasis Augmented Reality (AR) sebagai Media Pembelajaran Teks Prosedur di Magelang. Diglosia: Jurnal Kajian Bahasa, Sastra, Dan Pengajarannya, 3(4), 351–364. https://doi.org/10.30872/diglosia.v3i4.125

Harefa, E. P., Waruwu, D. P., Hulu, A. H., & Bawamenewi, A. (2023). Pengembangan media pembelajaran bahasa indonesia berbasis website dengan menggunakan model ADDIE [Development of website-based Indonesian language learning media using the ADDIE model]. Journal on Education, 06(01), 4405–4410.

Hidayat, L. (2024). Pengembangan media belajar IPA materi tata surya melalui aplikasi

augmented reality untuk peningkatan motivasi belajar siswa SD negeri di Kecamatan Adiwerna Kabupaten Tegal. *Journal of Education Research*, *5*(1), 781-794.

Isa, W. N., Musril, H. A., & Zahrati, W. (2022). Implementasi Teknologi Augmented Reality Dalam. Jurnal Jaringan Sistem Informasi Robotik (Jsr), 6(1), 1–13.

Isini, S., Mahmud, M., Ardiansyah, & Hasiru, R. (2025). Analisis Faktor-Faktor Yang Mempengaruhi Hasil Belajar Siswa di SMPN 2 Bulawa Kecamatan Bulawa Kabupaten Bone Bolango Provinsi Gorontalo. JOURNAL OF ECONOMIC AND BUSINESS EDUCATION, 3(1), 123–132.

Iskandar, S. (2023). Pengaruh Penggunaan Media Pembelajaran Assemblr EDU Terhadap Motivasi dan Hasil Belajar Siswa Pada Materi ASEAN Kelas VI. 7(2), 33–48. http://repository.radenintan.ac.id/11375/1/PERPUS PUSAT.

Khalil, M. (2025). Pengembangan AR Book Bioinformatika: Visualisasi In Silico Potensi Tanaman Herbal Lokal. Jurnal Jeumpa, 12(1), 57–68. https://doi.org/10.33059/jj.v12i1.11629

Khoirunnisa, K., Pramularso, E. Y., & Hardani, H. (2024). Keputusan Pembelian melalui Content Marketing dan Influencer Marketing pada Pengguna Aplikasi TikTok. Solusi, 22(4), 396–412. https://doi.org/10.26623/slsi.v22i4.10440

Kholiq, A. (2020). Development of B D F-AR 2 (Physics Digital Book Based Augmented Reality) to train students' scientific literacy on Global Warming Material. Berkala Ilmiah Pendidikan Fisika, 8(1), 50. https://doi.org/10.20527/bipf.v8i1.7881

Nabila, N. I., Sumantri, S., & Zakiah, L. (2024). Pengembangan Multimedia Interaktif AR" TereDaman" Berbasis Problem Based Learning Dalam Pembelajaran IPA Sekolah Dasar. *Jurnal Teknodik*, 41-50.

Prabowo, E., & Wakhudin, W. (2024). Pengembangan media augmenteded reality (AR) untuk meningkatkan motivasi belajar siswa pada mata pelajaran IPAS kelas 4 SD Negeri 3 Linggasari. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, *4*(2), 591-604.

Safira, I., Rahim, A., & Palangi, P. I. (2022). Efektivitas Augmented Reality (AR) pada Konsep Pembelajaran IPA Sekolah Dasar: Augmented Reality. *Klasikal: Journal of Education, Language Teaching and Science*, *4*(3), 685-692.