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AUGMENTED REALITY-BASED LEARNING MEDIA TO IMPROVE STUDENTS' UNDERSTANDING OF THE MATERIAL MY PROVINCE IS PART OF THE REGION OF INDONESIA

Dendi Irawan[1], Devi Afriyuni Yonanda[2*], Ryan Dwi Puspita[3]
[1,2]Universitas Majalengka
[3]IKIP Siliwangi
[2]deviyonanda1990@gmail.com

Abstract
The purpose of this study is to investigate how the use of Augmented Reality-based learning media can improve students' understanding of districts/cities and provinces in Indonesia. The background of this study is the low level of students' understanding of districts/cities and provinces in Indonesia. One innovation that has attracted attention is Augmented Reality, which integrates digital elements with physical reality. The methodology applied in this study is a qualitative approach with a case study design. Data were obtained through interviews, observations, and questionnaires distributed to students and teachers. This study involved sixth-grade students of SDN Sangiang II, with a focus on classes studying Pancasila Education regarding districts/cities and provinces as part of the Unitary State of the Republic of Indonesia. The results showed that the use of Augmented Reality-based learning media significantly improved students' understanding of districts/cities and provinces. Students who used Augmented Reality showed an average increase in their scores of 30% compared to students who learned with conventional methods. This study concluded that Augmented Reality-based learning media is an effective tool to improve students' understanding of the material "my province is part of the Unitary State of the Republic of Indonesia."
Keywords: *Learning Media; Augmented Reality; Pancasila Education*

Abstrak
Tujuan penelitian ini adalah menyelidiki bagaimana pemanfaatan media pembelajaran berbasis *Augmented Reality* dapat memperbaiki pemahaman siswa mengenai kabupaten/kota dan provinsi di Indonesia. Latar belakang penelitian ini adalah rendahnya pemahaman siswa mengenai kabupaten/kota dan provinsi di Indonesia. Salah satu inovasi yang menarik perhatian adalah *Augmented Reality* yang mengintegrasikan elemen digital dengan realitas fisik. Metodologi yang diterapkan dalam penelitian ini adalah pendekatan kualitatif dengan desain studi kasus. Data diperoleh melalui wawancara, observasi, dan kuesioner yang disebarkan kepada siswa dan guru. Penelitian ini melibatkan siswa kelas VI SDN Sangiang II, dengan fokus pada kelas yang mempelajari Pendidikan Pancasila mengenai kabupaten/kota dan provinsi sebagai bagian dari wilayah Wilayah Indonesia. Hasil penelitian menunjukkan bahwa pemanfaatan media pembelajaran berbasis *Augmented Reality* secara signifikan meningkatkan pemahaman siswa mengenai kabupaten/kota dan provinsi. Siswa yang menggunakan *Augmented Reality* menunjukkan peningkatan nilai rata-ratanya sebesar 30% dibandingkan dengan siswa yang belajar dengan metode konvensional. Penelitian ini menyimpulkan bahwa media pembelajaran berbasis *Augmented Reality* merupakan alat yang efektif untuk meningkatkan pemahaman siswa terhadap materi provinsiku bagian dari Wilayah Indonesia
Kata Kunci: Media Pembelajaran; *Augmented Reality*; Pendidikan Pancasila

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Introduction

We are now in the era of globalization and digitalization. A deep understanding of geography, particularly the regencies/cities and provinces of Indonesia, is crucial in the educational context. This understanding not only strengthens students' local awareness but also equips them with the knowledge to face global challenges. Indonesia currently has 38 provinces and 416 regencies/cities, each with its own unique characteristics and potential. Mastering this diversity will strengthen national identity and foster students' patriotism.

However, learning related to Pancasila Education and geography at the school level still faces several complex obstacles. One of the main problems lies in the unengaging teaching approach and minimal interactivity, resulting in students' lack of motivation and difficulty in understanding the material deeply. Abstract or conceptual material is often presented textually without visual support or contextual experiences, resulting in low student engagement in the learning process. This situation presents a challenge for teachers to reflect on and evaluate their learning strategies, including selecting methods and media that not only capture students' attention but are also effective in building conceptual understanding and connections to real life. The use of appropriate and relevant learning media can have a positive impact on increasing learning motivation, encouraging active student participation in class, and strengthening their understanding of the material, especially material that requires focus, concentration, and critical thinking. Therefore, innovation is needed in the selection of learning media that can bridge students' cognitive needs through more engaging and meaningful learning methods.

Learning media encompasses a variety of tools, materials, or technologies designed to help deliver learning materials more effectively and efficiently. These media can be visual, audio, audiovisual, or digital, depending on the learning objectives and context. The appropriate use of learning media not only increases the effectiveness of the teaching and learning process but also plays a role in creating more meaningful learning experiences for students. Interactive multimedia is the most popular new way of learning among various learning media (Zuniarti et al., 2025). By combining various elements such as text, images, video, and audio, interactive multimedia can create a dynamic and engaging learning environment for students. One of the main advantages of interactive multimedia is its ability to increase student engagement. For example, in language learning, students can interact with applications that display interactive dialogues, where they can listen to the pronunciation of words, practice speaking, and even participate in simulated conversations. In this way, students are not just passive listeners but are actively involved in the learning process, which in turn can improve information retention. This shows that interactive learning experiences can create a stronger emotional connection between students and the material being studied.

Along with technological developments, one innovation that has experienced rapid progress is Augmented Reality (AR) technology. This technology has the ability to project virtual objects, both two-dimensional and three-dimensional, realistically into the real world, creating a more interactive and engaging learning experience. According to Ismiyani (2020), AR is a form of technology that combines virtual objects with the real environment directly and in real time. Furthermore, AR technology can create an immersive learning environment, where students can interact directly with the displayed digital content (Nazilah & Ramdhan, 2021). This opens up new opportunities in education, particularly in creating a collaborative, exploratory learning environment that aligns with the learning styles of 21st-century students.

Augmented Reality (AR)-based learning media provides a more interactive, dynamic, and contextual learning experience than conventional methods. This technology enables the integration of real-world and virtual elements, creating a more lively and meaningful learning

environment. According to Samala et al., (2023) the application of AR in learning not only enhances the overall learning experience but also encourages active student engagement in the learning process. This is supported by the findings of Ghanbaripour et al.,(2024), (Socrates & Fatni Mufit, 2022), which demonstrate that AR is effective in conveying abstract material through engaging visual representations and hands-on experiences. In the context of geography and civics learning, the use of AR technology allows students to explore spatial, symbolic, and cultural information more deeply and intuitively. Thus, AR is a relevant technological innovation for enriching students' understanding of complex concepts and their connections to the real world.

The application of AR in education provides clearer visualizations of difficult-to-understand concepts, such as maps, building structures, and geographical phenomena. Miyanti et al., (2023) added that AR allows students to see and even interact with objects through digital devices such as tablets or smartphones. Anggraeni et al., (2021) emphasized that the use of interactive media, such as Augmented Reality (AR), has great potential to increase student learning interest. This media creates a more attractive and enjoyable learning environment, thereby reducing student boredom during the learning process. With the visual elements and hands-on experiences offered by AR, students become more interested and actively engaged in following the learning material. Similar findings were also expressed by Alzahrani (2020), who highlighted that AR not only increases learning interactivity but also can boost learning motivation, strengthen concentration, and expand information accessibility, especially in the context of online learning. This shows that AR technology can be an innovative solution for creating more effective and responsive learning to students' learning needs in the digital era.

Zaid et al., (2022) concluded that AR can make the learning process more engaging and enjoyable, thus boosting student motivation. Li et al., (2025) emphasized the importance of pedagogical design, teacher training, and inclusive access in utilizing AR and VR in education. One application that supports AR-based learning is Assemblr Edu, which allows teachers to create interactive three-dimensional content (Chairudin et al., 2023). Akçayır & Akçayır, (2017) also stated that AR encourages kinesthetic, collaborative, and creative learning, as well as improving motivation, retention, and conceptual understanding.

Several previous studies have shown that the use of Augmented Reality (AR)-based learning media has a positive impact on various aspects of the learning process. Muali et al. (2020) revealed that the use of AR can significantly improve students' conceptual understanding because this technology presents material in a more concrete and easy-to-understand visual form. Furthermore, Carolina (2022) stated that AR also contributes to increasing student learning motivation because the interactivity offered can build curiosity and enthusiasm to explore the material more deeply. Trials of AR-based learning media showed very positive results, indicating high student interest (Pujakesuma et al., 2024). Another study by Kumalasari & Mochamad Ridwan (2023) supports these findings by showing that the integration of AR in learning has a positive impact on improving student learning outcomes. Furthermore, Hermawan & Hadi (2024) emphasized that the use of AR not only improves understanding but also significantly develops students' analytical skills in understanding and connecting various pieces of information. These findings indicate that AR technology can be an effective and adaptive learning medium to support the achievement of learning objectives more comprehensively.

From a theoretical perspective, Augmented Reality (AR)-based learning has a strong foundation because it aligns with the principles of constructivism and multimodal theory. Constructivism theory emphasizes that knowledge is actively constructed by students through

direct experience, exploration, and interaction with their environment. In this context, AR provides a space for students to actively engage in the learning process through immersive and contextual experiences, which strengthen the process of constructing meaning. This technology presents visual and interactive elements that enable students to construct understanding independently and meaningfully. Multimodal theory, as proposed by Philippe et al. (2020) multimodal interactions observed improved students' ability to generate ideas thus facilitated a sense of presence and immersion. AR is able to harmoniously integrate these three modalities, thereby maximizing students' cognitive processes in understanding the material. Thus, AR-based learning is not only technologically innovative but also has a strong theoretical foundation, making it relevant for application in various modern educational contexts.

Research Methods

This research employed a qualitative approach with a case study design. This approach allowed the researcher to explore students' experiences in depth in the context of using Augmented Reality (AR)-based learning media. The subjects were nine sixth-grade elementary school students at SDN Sangiang II, Banjaran District, who had participated in Pancasila Education learning using AR media. Subjects were selected purposively, taking into account student engagement in relevant learning activities.

Data collection techniques included questionnaires, observations, and interviews. The questionnaires were used to obtain data on the level of understanding of the material before and after the use of AR media in learning. The instrument consisted of open-ended and closed-ended questions designed to measure students' cognitive understanding. Observations were conducted during the learning process, observing student engagement, interactions with the media, and classroom dynamics. Interviews were conducted with students, teachers, and parents to gain a comprehensive perspective on the learning experience using AR media. The data collected in this study were analyzed using thematic analysis, an approach aimed at systematically identifying, analyzing, and interpreting patterns of meaning emerging from qualitative data (Braun & Clarke, 2019). This process encompasses steps ranging from a thorough reading of the data, initial coding, and the development of key themes that represent the research findings. Thematic analysis was chosen because it allows for the depth of meaning derived from the experiences and perceptions of respondents, both students and teachers. To enhance the validity and credibility of the findings, data triangulation was conducted by comparing and linking results from three primary sources: questionnaires, observations, and interviews. This approach enabled researchers to obtain a more comprehensive and objective picture of the impact of using Augmented Reality (AR)-based learning media while minimizing bias that might arise from relying solely on a single data source. Thus, triangulation not only strengthens the validity of the data but also enriches understanding of the context and dynamics that occur during the learning process. Furthermore, before the questionnaire instrument was used for primary data collection, a pilot test was conducted to ensure that each item had adequate content validity and was able to consistently measure the intended aspects. This pilot test aimed to assess the clarity, relevance, and understandability of the items to respondents, as well as to identify potential bias or ambiguity in the wording of the questions. This strategy was implemented as part of a systematic procedure to improve the quality of the instrument, in line with the principles of validity and reliability in qualitative research.

Results and Discussion

The results of this study clearly demonstrate that the use of Augmented Reality (AR)-based learning media has a positive and significant impact on improving students' understanding of the material on districts/cities and provinces as part of the Indonesian territory within the context of Pancasila Education. Based on the data obtained, there was a 30% increase in average scores on comprehension tests after learning using AR, compared to students who received learning through conventional methods. This indicates that AR technology makes a significant contribution to strengthening students' conceptual understanding. A comparison between the group of students learning with a traditional approach and those using AR media revealed a striking difference; students learning with AR were better able to explain core concepts in Pancasila Education coherently, critically, and contextually. In addition to cognitive aspects, the results of this study also reflected improvements in the affective aspect, with students using AR reporting higher levels of satisfaction with their learning experience. They felt more interested, engaged, and comfortable during the learning process. Thus, the integration of AR into learning not only strengthens students' understanding of the material but also improves the overall quality of the learning experience.

The results of the data analysis in this study are presented systematically through graphs and tables to facilitate interpretation and understanding of the findings. Graphs are used to visually illustrate the increase in average student scores before and after learning using Augmented Reality (AR). This visualization demonstrates a positive trend reflecting the effectiveness of AR in improving student understanding. Meanwhile, tables are designed to display detailed quantitative data, specifically regarding the comparison of test results between the experimental group using AR and the control group using conventional learning methods.

After the learning process using Augmented Reality (AR) was completed, questionnaires were distributed to nine students and five teachers to gauge their responses to the use of the media. The instrument used was a Likert scale with a range of 1 to 5, with 1 indicating "strongly disagree" and 5 indicating "strongly agree." The questionnaire results were then processed to obtain an average score for each assessment indicator. Overall, the majority of students responded positively, stating that the use of AR made the learning process more engaging and enjoyable. Furthermore, they found it easier to understand important concepts in the Pancasila material, particularly regarding district/city and provincial boundaries. This media was also deemed capable of increasing student participation and activeness during the learning process. Similarly, teachers also gave positive assessments, acknowledging that AR media was more effective than traditional learning methods previously used. They observed increased student engagement and ease in explaining material through the visualizations and interactions offered by AR technology.

Following the learning session using Augmented Reality (AR), researchers and teachers conducted direct observations of student behavior and responses during the session. The observations revealed several important findings illustrating the positive impact of using AR media in learning activities. First, approximately 85% of students were seen actively asking, answering, and discussing questions when AR objects appeared on the screen, indicating increased participation and curiosity. Second, students appeared more focused and emotionally engaged when the material was presented in interactive 3D visuals, strengthening their understanding of the concepts being taught. Third, the learning atmosphere became more orderly and conducive; students' attention was more focused on the media used, reducing distractions during learning. Fourth, the learning process is more efficient because students can grasp the material more quickly with the help of concrete and contextual visualizations. These

findings indicate that AR media not only captures students' attention but also creates a more active, conducive, and meaningful learning environment.

The results of triangulation of data from questionnaires, observations, and interviews consistently show that the use of Augmented Reality (AR)-based learning media is highly effective in elementary schools, particularly in Pancasila Education lessons, focusing on districts/cities and provinces as part of Indonesia's territory. AR technology serves not only as a tool.

Table 1. Comparison of Learning Outcomes

Student Group	Average Comprehension Test Score	Percentage Increase
Traditional Method	65	-
Augmented Reality (AR) Method	84.5	30%

Interpretation of the results indicates that Augmented Reality (AR) not only improves student understanding but also increases their motivation and engagement in learning. Other research suggests that the use of AR in education can create a more immersive and enjoyable learning experience for students.

The results of this study make a significant positive contribution to educational practice in Indonesia, particularly in efforts to improve the quality of learning that is relevant to the needs of the times. Indonesia, as a country rich in cultural, linguistic, and geographic diversity, faces unique challenges in implementing learning approaches that effectively reach and facilitate all students. Conventional, textual, one-way approaches often fail to foster student engagement, particularly in understanding abstract concepts in Pancasila Education. In this context, the use of Augmented Reality (AR)-based learning media offers an innovative solution that can bridge this gap. AR technology enables the presentation of material that is more contextual, engaging, and accessible to a wide range of students. This encourages deeper understanding, builds emotional connections with the material, and fosters a stronger sense of nationalism. Therefore, the application of AR in Pancasila learning has the potential to be an adaptive and transformative educational strategy in addressing the challenges of education in a multicultural and dynamic Indonesia.

The use of Augmented Reality (AR) in learning has been proven to increase student motivation and encourage their active participation in the learning process. AR not only presents material visually but also creates an engaging, interactive, and immersive learning experience, making students more enthusiastic and engaged. The uniqueness of this medium is able to stimulate students' intrinsic motivation because they don't simply receive information passively, but rather interact directly with the material through three-dimensional visual elements, sound, and movement. Thus, AR serves not only as a learning aid but also as a catalyst for curiosity and enthusiasm for learning. For example, when students were given the task of creating a presentation on the values of Pancasila using AR technology, they demonstrated high engagement in terms of creativity, collaboration, and efforts to convey information in an engaging manner. Students were more willing to invest time and effort in completing the assignment because they felt like an active part of the learning process, not just recipients of information. This demonstrates that AR plays a strategic role in fostering deeper emotional and cognitive engagement in students.

The integration of AR technology into education in Indonesia not only promises improved academic understanding but also has the potential to create a more inclusive and engaging learning experience for students from diverse backgrounds. By utilizing AR, educators can create a more enjoyable, interactive, and responsive learning environment for students, thereby producing a generation better prepared to face global challenges. In conclusion, the use of AR in education not only offers a solution to problems with understanding material, but can also be an effective tool for increasing student engagement and motivation, making the learning process more enjoyable and meaningful. Therefore, the implementation of this technology in the Indonesian education curriculum is crucial for further consideration and development.

Although the results of this study demonstrate a positive impact on the use of Augmented Reality (AR)-based learning media, there are several limitations that need to be considered as evaluation material and considerations for further research development. One major limitation is the relatively small sample size, involving only a handful of students from a single school, so the results obtained may not necessarily represent the diversity of student characteristics across Indonesia. This limitation may affect the level of generalizability of the findings. Furthermore, the study's limited focus on a single subject, Pancasila Education, makes these findings unable to be used to conclude the effectiveness of AR in learning other subjects. Therefore, to strengthen the validity and scope of the research results, it is recommended that further studies be conducted involving a larger and more diverse sample size, both in terms of region and educational level. Research should also cover a variety of subjects, so that the effectiveness of AR media can be seen in a broader context. Furthermore, it would be very beneficial to conduct longitudinal research to observe the long-term impact of AR use on the development of student understanding, motivation, and learning achievement in a sustainable manner.

Conclusion

This study demonstrates that the application of Augmented Reality (AR)-based learning media can effectively improve students' understanding of Pancasila Education material, particularly regarding regencies/cities and provinces as an integral part of Indonesia's territory. AR technology not only serves as a sophisticated learning tool but also transforms the way students access, understand, and interact with information. With its immersive and interactive approach, AR provides a more lively and contextual learning experience. Students who participate in learning using AR media show significant improvements in their average learning outcomes compared to those who receive the material through conventional methods. One of the main advantages of AR is its ability to present interactive maps of a region, allowing students not only to view static two-dimensional images but also to directly interact with important elements such as geographic landmarks, historical information, and local culture. This interactivity makes the learning process more engaging and meaningful, and helps students build a stronger spatial and conceptual understanding of regional structure and national identity. Thus, AR has great potential to become a relevant and innovative learning medium for improving students' competency in understanding the territorial integrity of the Unitary State of Indonesia.

I plan to develop and apply this Augmented Reality (AR)-based learning method to other subjects and materials beyond Pancasila Education. AR's potential is vast and can be optimally utilized in various learning contexts. For example, in Natural and Social Sciences (IPAS), AR technology can be used to enable students to virtually "visit" historical sites, witness important events that occurred at those locations, and explore information related to their figures, cultures, and geographic backgrounds. With this approach, history learning is no longer

an activity focused on memorizing dates and facts, but rather transforms it into a lively, immersive, and enjoyable learning experience. Similarly, in science lessons, AR can be used to visualize abstract and complex concepts, such as the water cycle, the circulatory system, and the structure of the solar system, in interactive, three-dimensional forms that are easy for students to understand. This approach can not only increase the appeal of learning but also help students build a stronger and more applicable conceptual understanding. Thus, the use of AR has great potential to enrich cross-subject learning strategies in an innovative and transformative way.

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