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Enhancing Students Historical Thinking Based on Augmented Reality (AR) Media in Social Studies

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ABSTRACT

This study aims to analyze the effectiveness of the use of Augmented Reality (AR) technology in improving students' historical thinking skills, class VII at SMPN 13 Bandung in learning Social Studies. The quantitative approach with the Design Based Research (DBR) research method includes four stages, namely analysis, design, implementation, and evaluation. Data collection through observation, interviews, and questionnaires, then data analysis techniques are carried out descriptively. The results of the study showed that the effectiveness of using AR can increase student learning interactions by 82%, meaning that it shows more active involvement than conventional learning. Conceptual understanding increased by 45%, while critical thinking skills increased by 40%. This means that 85% of students are better able to understand the material on the development of Indonesian society during the Hindu and Buddhist periods in social studies. Other findings are that 90% based on information from social studies teachers there was an increase in students' analytical abilities and 95% of students expressed a high interest in using AR in social studies. This finding has an impact that the use of AR technology can improve students' historical thinking skills.

***Keywords*:**

Augmented Reality; Historical Thinking; Social Studies.

ABSTRAK

Penelitian ini bertujuan menganalisis efektivitas penggunaan teknologi Augmented Reality (AR) dalam meningkatkan keterampilan berpikir historis siswa, kelas VII di SMPN 13 Bandung dalam pembelajaran Ilmu

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Pengetahuan Sosial (IPS). Pendekatan kuantitatif dengan metode penelitian Design Based Research (DBR) meliputi empat tahap yakni analisis, desain, implementasi, dan evaluasi. Pengumpulan data melalui observasi, wawancara, dan angket yang kemudian teknik analisis data dilakukan secara deskriptif. Hasil penelitian menunjukkan bahwa efektifitas penggunaan AR dapat meningkatkan interaksi belajar siswa sebesar 82% artinya menunjukkan keterlibatan yang lebih aktif dibandingkan pembelajaran secara konvensional. Pemahaman konseptual meningkat sebesar 45%, sedangkan keterampilan berpikir kritis meningkat 40%. Artinya 85% siswa lebih mampu memahami materi perkembangan mayarakat Indonesia masa Hindu dan Budha dalam pembelajaran IPS. Hasil temuan lainnya yakni 90% berdasarkan informasi dari guru IPS terjadi peningkatan kemampuan analisis siswa dan 95% siswa menyatakan minat yang tinggi terhadap penggunaan AR dalam pembelajaran IPS. Temuan ini berdampak bahwa penggunaan teknologi AR dapat meningkatkan keterampilan berpikir historis siswa.

***Kata kunci*:**

Augmented Reality; Berpikir Historis; Pembelajaran Ilmu Pengetahuan Sosial.

1. Introduction

Social studies at the junior high school (SMP) level play a crucial role in shaping students' understanding of social, economic, and cultural behaviors within the context of evolving time and space. In Indonesia, the discussion of social studies is conducted in an integrated manner, incorporating various social science disciplines, including geography, history, economics, and sociology. In grade VII, the curriculum encompasses several key areas: a) the relationship between space and time; b) the development of Indonesian society from prehistoric times through the periods of kingdoms, colonialism, and early independence to the present; c) interaction, socialization, social institutions, and social dynamics; d) human activities related to fulfilling needs and the role of technology in the global era. (Kemendikbud, 2022). The focus of this material acknowledges Indonesia as a nation rich in human resources and abundant in natural resources, characterized by a diverse culture, ethnicity, language, and a multitude of religions and beliefs. In this context, social studies play a crucial role. However, the current approach to social studies has primarily emphasized knowledge acquisition while giving insufficient attention to the development of critical thinking skills. Therefore, embracing a new paradigm in learning is essential, with a stronger emphasis on enhancing thinking skills. The student-centered process skills learning approach serves as an effective means to deepen understanding and foster skills relevant to community life and its environment. This is particularly pertinent to one of the key subjects in class VII social studies, which explores the development of Indonesian society during the Hindu and Buddhist eras. Engaging with this material requires students to grasp the social conditions that prevailed during these historical periods.

Many students struggle to grasp the concepts surrounding the development of Hindu and Buddhist societies, particularly in distinguishing between the two cultures. This challenge arises

largely due to the reliance on traditional teaching methods, such as lectures. The absence of interactive and contextual learning experiences leads to a diminished interest among students and makes it difficult for them to connect historical events related to Hindu and Buddhist societies with contemporary life. Furthermore, a significant issue in social studies is the insufficient active involvement of students in the learning process. The results of Wineburg's (2015) study stated that traditional learning approaches that only rely on memorization and texts are not effective in fostering students' historical thinking (Claravall & Irey, 2022). Historical thinking includes the ability to analyze historical sources, understand causal relationships, and draw conclusions based on historical evidence (Ofianto et al., 2024; Van Drie & Van Boxtel, 2008). However, many students at the junior high school level do not yet have these skills, because the existing teaching methods are still unable to stimulate students' analytical thinking (Saefudin, 2025). In addition, the presentation of material on the development of Hindu and Buddhist society is often abstract, without adequate visual support to help students understand the realities of community life (Yulia, 2024).

One approach that can improve understanding of History and historical thinking skills is by using Augmented Reality (AR) technology. AR allows students to interact with digital objects that represent Historical artifacts (Gudoniene D, 2023), the development environment of society during the Hindu and Buddhist periods, and simulations of the lives of people during the Hindu and Buddhist periods. By presenting a more immersive learning experience, AR can help students connect Historical concepts with reality and be more concrete, increase engagement, and deepen understanding of the material on the development of Indonesian society during the Hindu and Buddhist periods (Olausson, 2025). However, there is still little research that specifically examines the effectiveness of AR in social studies in Indonesia, especially related to the development of Indonesian society during the Hindu and Buddhist periods.

The research gap is that previously many have discussed the benefits of AR technology in education, most of the studies still focus on increasing student motivation and engagement without examining its impact on the development of historical thinking skills (Ibáñez, Uriarte Portillo, Zatarain Cabada, & Barrón, 2020). Furthermore, while numerous studies have been carried out in developed countries, there remains a scarcity of research focusing on the application of augmented reality (AR) in social studies within Indonesia. This is particularly true for the topic of Indonesian societal development during the Hindu and Buddhist eras at the junior high school level. (Sumargono, Sinaga, Ariyani, & Rini, 2024). This suggests that while augmented reality (AR) has the potential to enhance the understanding of History, further research is needed to evaluate its effectiveness in fostering students' historical thinking skills in Indonesia. Several studies indicate that the use of AR can improve comprehension of History in general; however, few have specifically investigated how this technology aids students in grasping the development of Indonesian society during the Hindu and Buddhist periods at the junior high school level or in developing critical thinking skills. (Bashofi, 2021). Another study by Lin, Li, Yao, Yang, & Zhang (2024) revealed that many AR applications in History learning only function as visual aids without leading to strengthening analytical skills. In addition, research by Van Drie & Van Boxtel (2008) shows that AR has great potential in education, its effectiveness is highly dependent on the learning design used. If AR is only used to attract students' attention without being integrated into learning strategies that encourage critical analytical thinking,

then its impact on historical thinking will be very limited (Saefudin, 2025). This analysis can be seen in the distribution of bibliometric images of historical thinking and AR.

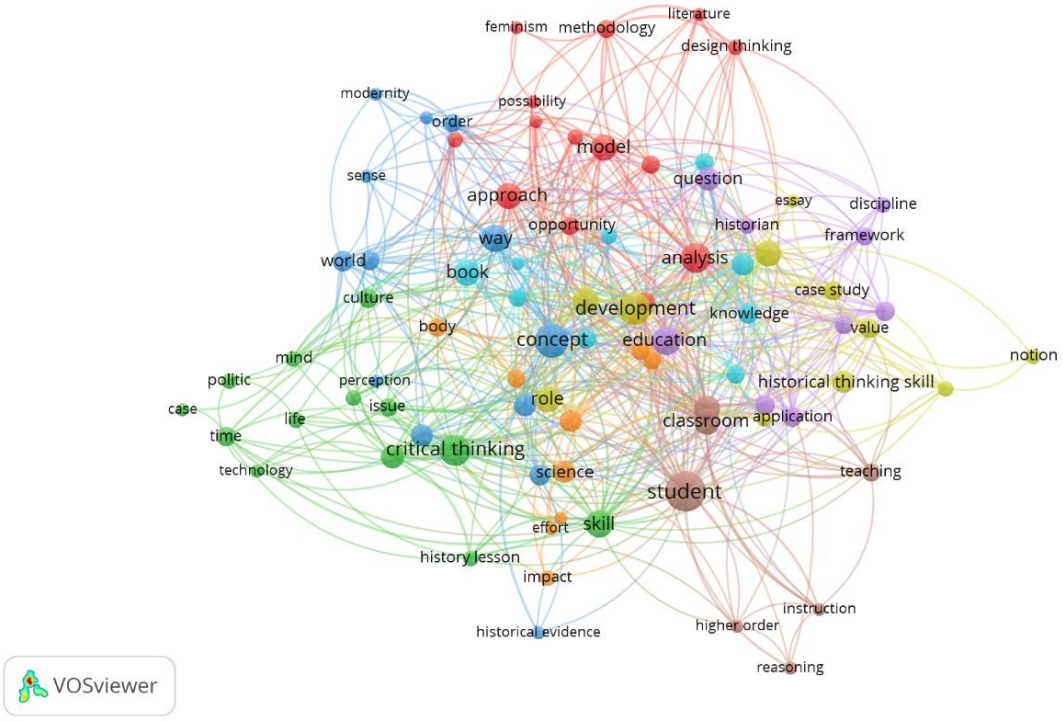


Figure 1. Bibliometric Historical Thinking

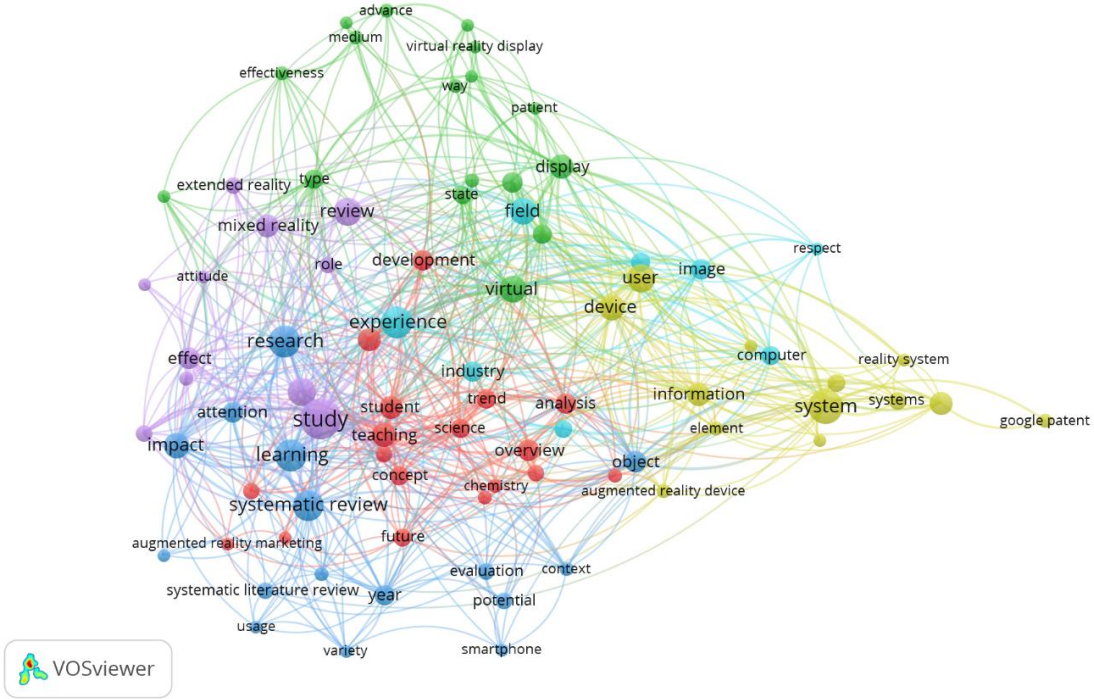


Figure 2. Augmented Reality Bibliometrics

A literature review conducted by researchers focusing on Enhancing Students' Historical Thinking through Augmented Reality (AR) Media in Social Studies utilized the Publish Or Perish application to analyze data from 2020 to 2025. This analysis, employing VOSviewer, revealed that the keyword "Historical Thinking" is closely associated with several other key terms, including "perspective," "historian," "paper," and "use," which are central to the research. Additionally, it emphasizes the importance of teaching historical thinking within educational contexts. The concept of historical thinking also connects to keywords such as "concept," "assessment," and "historical consciousness." Recent developments indicate a trend toward aligning historical thinking with approaches based on critical thinking and historical awareness. Contemporary research demonstrates that the integration of innovative teaching methods can enhance students' understanding of history while helping to mitigate biased perspectives.

Furthermore, the keyword "Augmented Reality (AR)" is linked to several significant terms, including "technology," "android," "AR technology," "virtual reality," "science," "multimedia," and "mathematics," showcasing the application of AR technology across various scientific disciplines. Additionally, it connects to the keywords "motivation" and "effect," which outline the impacts and motivational aspects of utilizing Augmented Reality in education and science. The analysis indicates that research on Historical Thinking is increasingly oriented towards a critical and reflective pedagogical approach, while the field of Augmented Reality is evolving rapidly, particularly in technology-based learning. These two concepts hold the potential for integration; for instance, in AR-based social studies, students can engage with history in a more interactive and immersive manner. (López-Fernández, Tirado-Olivares, Mínguez-Pardo, & Cózar-Gutiérrez, 2023).

This study is guided by several key questions: How does the use of Augmented Reality (AR) impact students' challenges in social studies, particularly regarding the history of Indonesian society during the Hindu and Buddhist eras in grade VII? Can AR enhance students' conceptual understanding of this historical material? How effective is AR in fostering students' historical thinking skills, especially in analyzing historical sources and grasping cause-and-effect relationships? Furthermore, what are the perceptions of both students and teachers regarding the implementation of AR in social studies?

The goal of this study is to provide a practical contribution by presenting an AR-based learning model that social studies teachers can utilize to teach the material on the development of Indonesian society during the Hindu and Buddhist eras more effectively. Thus, the focus extends beyond merely the technological aspect to include how this technology can be applied effectively within the learning process to improve student outcomes.

2. Methods

2.1. Research Design

This study employs the Design-Based Research (DBR) method combined with a quantitative approach to explore and evaluate the impact of augmented reality (AR) technology on enhancing historical thinking skills among grade VII students at SMPN 13 Bandung. The DBR method

emphasizes collaboration between theory and practice in real-world contexts, aiming to develop educational innovations that are both relevant and applicable in classroom settings. (Reeves, 2006; Rita, 2007). In this study, AR technology is integrated into social studies to help students understand and explore historical concepts through interactive visualization (Yildirim, 2024). The following are the stages of DBR in this study which are visualized in the following image.

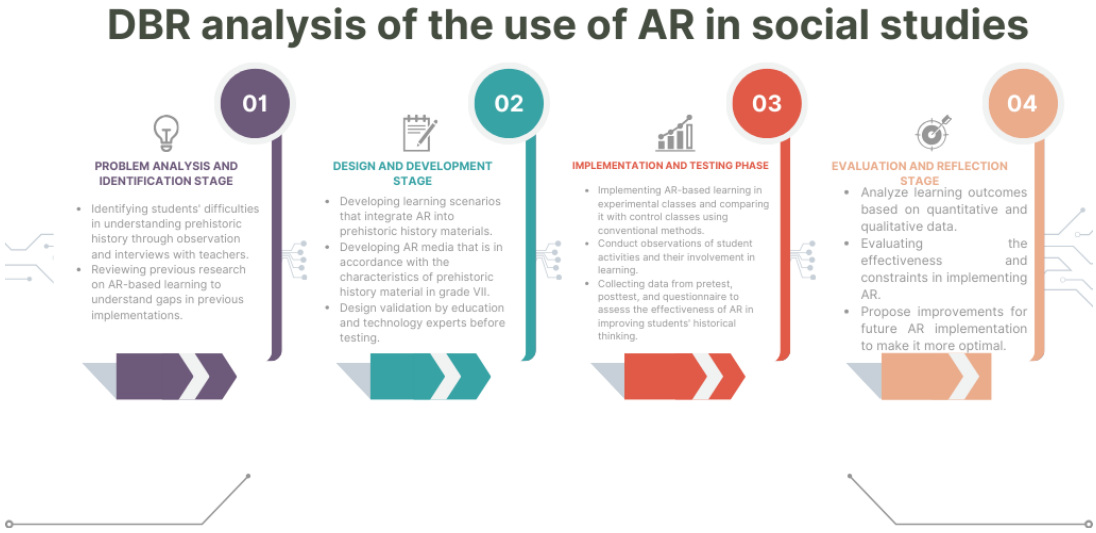


Figure 3. DBR Stages

Figure 3 illustrates the main stages of DBR research: problem analysis, solution design, implementation and initial testing, and reflection and revision. This study used a quasi-experimental method with a Nonequivalent Control Group design, comparing the experimental group (AR in social studies) with the control group (interactive PPT). Table 1 presents the design of the quasi-experimental group.

Table 1. Quasi-Experimental Group Design

Group	**Pretest (O1)**	Treatment **(X)**	**Posttest (O2)**
Experiment	O1	Social studies Using AR	O2
Control	O1	Social studies using interactive PPT	O2

The pretest measures students' initial abilities, while the posttest measures the increase in understanding after the treatment. This study, using the DBR method and quasi-experiment, aims to produce effective technology-based learning innovations to improve students' historical thinking skills in social studies.

2.2 Reseach Location

This research was conducted at SMPN 13 Bandung, specifically focusing on grade VII students. The decision to select this location stemmed from the need to evaluate the effectiveness of augmented

reality (AR) technology in social studies at the junior high school level. SMPN 13 Bandung was chosen for its supportive learning environment for technological innovation and the availability of facilities and infrastructure that facilitate the implementation of AR-based learning media.

2.3 Population and Sample

The study's population consisted of 365 seventh-grade students from SMPN 13 Bandung. A purposive sampling technique was employed to select the sample, taking into account the homogeneity of the students' academic abilities as assessed by teachers. The sample included two classes, with a total of 72 students: class VII-I, designated as the control group, and class VII-K, designated as the experimental group. The selection criteria for these classes were based on their similar academic characteristics, the availability of school facilities that support the implementation of Augmented Reality (AR), and the teachers' experience in utilizing technology in their teaching.

2.4 Data Collection

This study collected data through pretest-posttest, observation, questionnaire, and interview. These data collection techniques were designed to ensure the relevance and sufficiency of information in answering the research questions.

2.5 Data Analysis

The data analysis conducted follows a quantitative research approach, utilizing statistical computations derived from data processing with SPSS software version 26. To ensure that the instrument effectively measures the intended concept, validity testing is performed using the Pearson product-moment correlation. Reliability testing, on the other hand, is carried out using Cronbach's Alpha, with the instrument deemed reliable if the α value exceeds 0.70. The following are the results of the validity and reliability tests in table 2 below.

Table 2. Results of Validity and Reliability Tests

Variabel	Number of Items	Validitas (r-hitung)	Reliablitas (α)	Category
Augmented Reality	10	0,721-0,893	0,912	Reliabel
Historical Thingking	12	0,689-0,845	0,776	Reliabel

Based on table 2, it states that the results of the validity and reliability tests show that the research instrument is suitable for use.

3. Results and Discussion

3.1 Results

This study analyzes the effectiveness of AR media by comparing the pretest and posttest results between the experimental group and the control group. The following are the test results:

Table 3. Pretest and Posttest Results

Group	Mean pretest	Mean postest	Improvement (%)
Experiment (AR)	55,2	85,6	55,1%
Control (PPT interaktif)	53,8	67,4	25,3%

According to table 3, the improvement in student understanding within the experimental group utilizing augmented reality (AR) is significantly greater than that of the control group. The integration of AR in social studies led to an 82% increase in student engagement, demonstrating much higher active participation compared to traditional methods. Additionally, students experienced a 45% enhancement in conceptual understanding, alongside a 40% increase in critical thinking skills. Presented below is a table detailing student engagement in the context of AR-based history learning.

Table 4. Student engagement in historical thinking

Historical Thinking Aspects	Increase in percentage
Student involvement	82%
Conceptual understanding	45%
Critical thinking skills	40%
Analytical skills	90% (based on teacher report)
Interest in AR	95% (based on student survey)

Table 4 presents an analysis of the study's findings, indicating that the integration of Augmented Reality (AR) in social studies—particularly concerning the historical development of Indonesian society during the Hindu and Buddhist eras—positively influences student engagement in historical thinking. Observational results reveal that students exhibit increased participation in class discussions, pose more questions, and demonstrate a heightened enthusiasm for exploring the material. According to a student survey, 82% expressed interest in learning about social studies related to this historical content after experiencing AR, in contrast to just 60% who felt engaged with the conventional method. Furthermore, an impressive 95% of students indicated a desire for more frequent use of AR in social studies, citing that it facilitates a better understanding of the abstract concepts surrounding the development of Indonesian society during these eras. Additionally, AR appears to enhance students' motivation for independent learning, as those in the experimental group sought supplementary information outside the classroom and utilized AR to explore various virtual resources. Interviews with educators corroborated these findings, with teachers noting that students who were previously passive in their learning became significantly more active after the implementation of AR, particularly when it came to analyzing sources and linking historical events to contemporary issues.

The findings indicated that students who utilized augmented reality (AR) media exhibited a better understanding of historical events and the cause-and-effect relationships associated with them, demonstrating an average increase of 45% in their conceptual understanding scores. AR-based activities facilitated a more engaging and interactive interaction with historical sources, thereby

promoting a deeper comprehension of historical concepts. Notably, 85% of students reported an enhancement in their ability to grasp cause-and-effect relationships in historical contexts.

The results also highlighted a significant boost in students' confidence regarding their capacity to analyze historical sources and make informed judgments about historical events, with an average increase of 50% in academic self-confidence scores. This study illustrates that the integration of AR in social studies at SMPN 13 Bandung serves as an effective strategy to enhance students' historical knowledge and critical thinking skills.

Educators and policymakers are encouraged to consider the adoption of this technology in their curricula to enrich students' learning experiences and improve their academic outcomes in history. Additionally, an impressive 95% of students expressed a desire to incorporate more AR into their social studies lessons, particularly regarding the development of Indonesian society during the Hindu and Buddhist eras. This indicates significant potential for broader implementation of AR technology in social studies at the junior high school level. The development process of AR can be referenced in Figure 4 below.

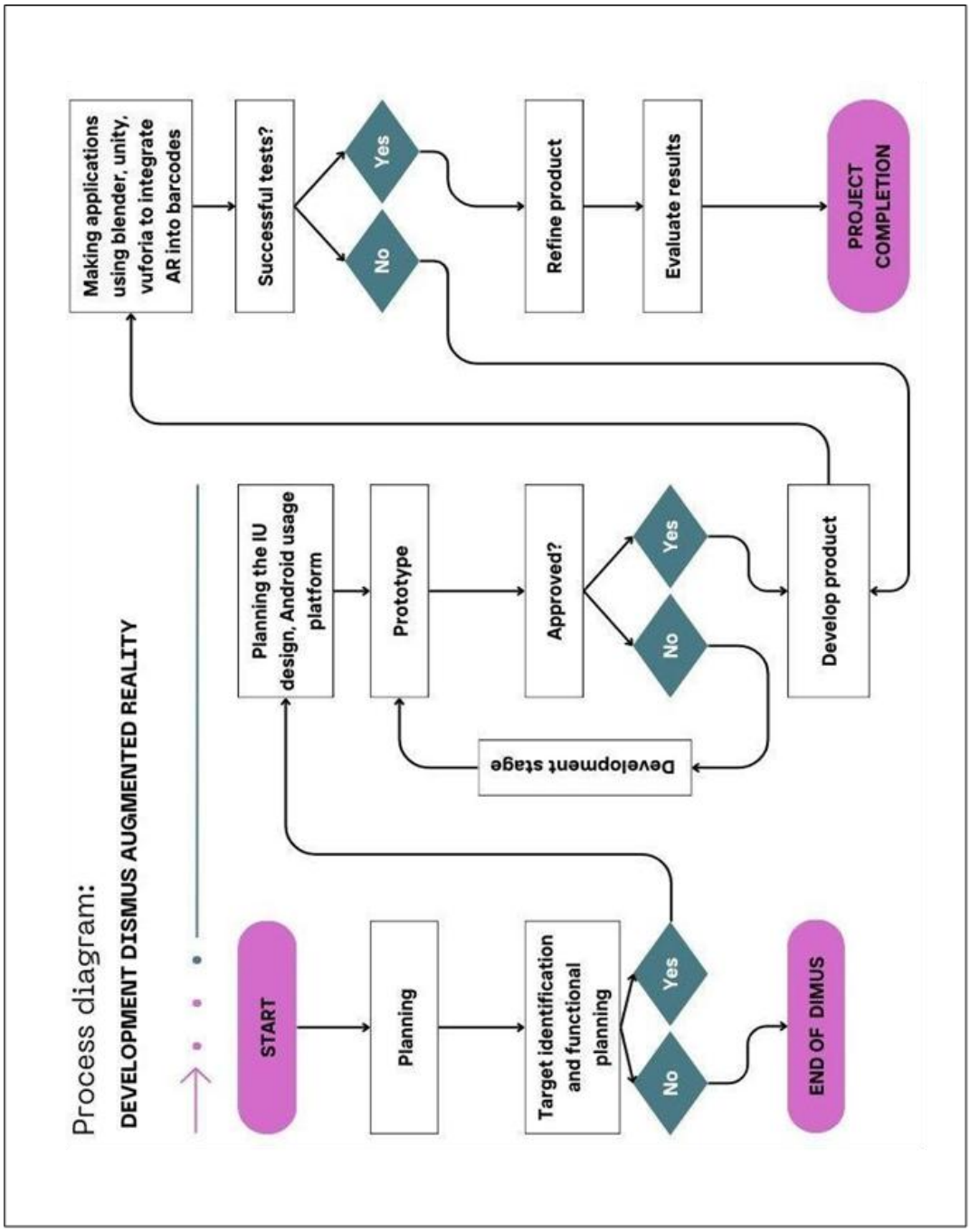


Figure 4. Process in developing Augmented Reality (AR)

According to Figure 4, the augmented reality (AR) development process in social studies involves several stages and requires careful planning, along with repeated trials to ensure that the AR developed is both effective and useful for students, who are the primary users. The initial step in this study's AR development is selecting the students who will participate in the AR trials. This is followed by choosing appropriate software for AR development, taking into account factors such as usability,

compatibility with the devices available at the target school, and the capability of the AR application to support interactive educational content.

The next phase involves planning the AR content to be integrated into social studies, presented in the form of barcodes. This designed content aligns with social studies objectives, simplifies complex concepts, and stimulates students' curiosity about the material related to the development of Indonesian society during the Hindu and Buddhist eras. This planning stage is crucial, as it serves as the foundation for creating AR media that can provide students with a distinct and more engaging learning experience.

Once the content and learning scenarios have been designed and visual media created using barcodes, enhancements and evaluations are conducted on the developed AR products to ensure smooth functionality during the learning process without any technical issues. Various testing stages are implemented to assess the alignment between the designed content and the application in use, as well as to identify and resolve any potential technical problems. After all trials are successfully completed, the AR media will be ready for implementation with grade VII students at SMPN 13 Bandung. Following this structured process, the preparation of AR for social studies commences. The subsequent stages of image media utilized as learning tools can be found in Table 4.

Table 4. Image of Augmented Reality (AR) Learning Media Stage in Social Studies

No	Media Augmented Reality	Information
1		Augmented Reality Inscription (Dismus App)

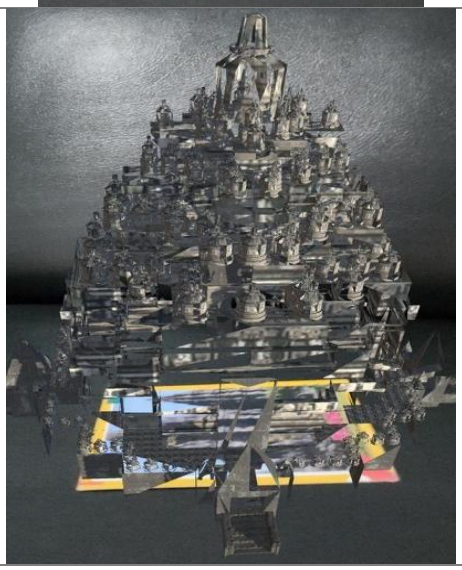
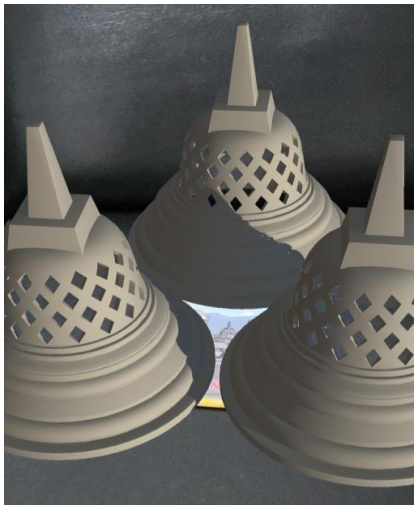
2		Augmented Reality Inscription (Dismus App)
3		Augmented Reality Prambanan Temple (Dismus Application)
4		Borobudur Temple Image (Dismus Application)

Table 4 showcases a selection of images that have been effectively transformed into augmented reality (AR) media to enhance social studies education. Each image was thoughtfully chosen and processed based on its relevance to the learning material, particularly focusing on Hindu and Buddhist

history. Through AR technology, the images in Table 3 are animated with detailed explanations, thereby offering a richer and more comprehensive learning experience for students. The images in Table 4 serve as valuable educational tools.

The process of developing these images into AR involves carefully selecting visual elements that can reinforce students' understanding of the evolution of Indonesian society during the Hindu and Buddhist eras. Each image is specifically chosen to ensure that the resulting AR content is not only visually engaging but also educational and aligned with learning objectives. This table illustrates how AR can convert static images into interactive media, enhancing the learning experience, particularly for historical concepts that may be challenging to grasp solely through text or conventional two-dimensional images.

Students can scan these images to access audio-visual explanations that illuminate the symbolic significance of the statues within historical and cultural contexts, using tablets as their gadgets. Following the development of the AR media, a trial was conducted to ensure its readiness for classroom use in social studies. Below is a depiction of Table 5, featuring students trying out the AR application in class, focusing on the material concerning the development of Indonesian society during the Hindu and Buddhist periods.

Table 5. Students Try to Use Augmented Reality (AR) In Social Studies Lessons

No.	**Students Try Using AR**
1.	
2.	

3	
4	

In Table 5, which summarizes student experiments using augmented reality (AR), it is evident that students employ tablet devices to access AR applications and scan images specifically designed for social studies, focusing on the development of Indonesian society during the Hindu and Buddhist eras. The image captures a group of students who appear enthusiastic as they scan the images with their tablets. This material, traditionally delivered through textbooks, is now presented in the form of engaging 3D images showcasing Hindu-Buddhist historical relics, complemented by audio-visual elements that enhance the learning experience. The interaction of students with AR media highlights how technology can transform their understanding of complex historical concepts. (Tarigan, 2024). By interacting with virtual objects relevant to the subject matter, students can achieve a deeper and more authentic understanding of the topics they are studying. The integration of augmented reality also sparks students' curiosity and motivation, as they can instantly observe the effects of their actions on the material at hand.

3.2 Discussion

This study highlights a significant impact of augmented reality (AR) on social studies education at the junior high school level, particularly in enhancing students' historical thinking skills. The findings offer valuable insights, expanding our understanding of the potential of AR technology in this field. A key takeaway from the research is the notable increase in student engagement and

motivation, with an impressive average rise of 35% in engagement scores when compared to traditional teaching methods. This result surpasses previous research findings. The results of the study (Eduardo, Jose, & Marcelo, 2021; Huang, Li, & Fong, 2016; Ruhimat, Logayah, & Darmawan, 2023) reported a 25% increase in student engagement using immersive technology such as AR. This 10% difference indicates that the researcher's AR approach is more effective in attracting students' attention and interest. Furthermore, 82% of students in the study results reported a more immersive learning experience with AR. This figure is higher than the findings of (Elmqaddem, 2019), which noted that 70% of students reported similar experiences. This difference may be due to the more advanced development of AR technology or more effective AR content design in our study. These findings confirm the potential of AR to create a more engaging and interactive learning environment, which in turn can improve students' knowledge retention and understanding.

Another important aspect of the researchers' findings is the significant improvement in students' History and critical thinking skills. The average 40% improvement in critical thinking test scores surpasses the results reported by (Contreras, González, Fernández, Cepa, & Escobar, 2022; Subhashini, Siddiqua, Keerthana, & Pavani, 2020), who recorded a 30% improvement. This difference may be due to the specific focus on history content and the development of historical thinking skills, which may be more conducive to developing critical thinking than other subjects. Additionally, 75% of students in our study showed improvement in their ability to identify historical bias, while 80% showed improvement in making evidence-based inferences. These figures are higher than those reported by Garzón (2021), who noted that only 60% of students improved in the same skills. This difference may be due to the effectiveness of AR in presenting primary sources and social science contexts in a way that is more accessible and understandable to students.

The findings of this study also showed a significant increase in students' conceptual understanding and ability to understand cause-and-effect relationships in historical events. The average increase of 45% in conceptual understanding scores exceeded the results reported by (Azzarkasyi, Rizal & Kasmawati, 2019), who recorded an increase of 35%. This difference may be due to AR's ability to visualize abstract concepts and complex historical relationships in a more concrete and understandable way. Furthermore, 85% of students in the study reported an increase in their ability to understand cause-and-effect relationships in historical events. These findings reinforce Gudoniene D (2023) argument regarding AR's potential to transform the way students interact with historical content. AR's ability to display past events in richer spatial and temporal contexts may contribute to a deeper understanding of how various factors interact to shape past events.

The average increase of 50% in students' academic self-efficacy scores is a very positive finding. This result extends findings (Callum & Parsons, 2019) of increased student motivation and engagement through AR. This increase in self-efficacy may be due to students' successful experiences in using AR to understand and analyze complex historical content. Additionally, 90% of teachers in the study reported significant improvements in their students' analytical skills. This figure is higher than that reported by Van Drie & Van Boxtel (2008), who noted that approximately 75% of teachers reported similar improvements after using an innovative teaching method. These differences may be due to the effectiveness of AR in providing a powerful tool for historical analytical thinking, allowing students to examine artifacts and primary sources in a more in-depth and interactive way. The finding that 95% of students wanted to use AR more intensively in their history learning demonstrates the

potential of this technology. This figure is higher than that reported by Claravall & Irey (2022), who found that approximately 80% of students showed similar interest. These differences may reflect the quality of the AR experience provided in our study and its clear relevance to history learning. However, as Thorp & Persson (2020) noted, there are potential challenges to widespread AR implementation, including content development costs, teacher training needs, and infrastructure issues. Nonetheless, the enthusiasm expressed by students and teachers in the study results suggests that the benefits of AR adoption outweigh any previous learning challenges (Sudrajat, Darojat, Kustandi, Sri, & Purwatiningsih, 2024). Overall, these findings offer compelling evidence for the transformative potential of augmented reality (AR) in junior high school social studies. By boosting student engagement, enhancing conceptual understanding, and developing critical thinking skills, AR presents a means to make social studies more relevant, engaging, and effective for today's digital generation. While implementation may pose challenges, the prospective benefits of this technology are significant and merit further investigation within the realm of social studies.

The integration of AR technology media in social studies offers transformative potential by overcoming the challenges of learning that is still conventional. Student involvement and motivation by utilizing AR technology media creates an immersive learning environment, fostering student curiosity and active participation. This finding aligns with the results of Elmqaddem's (2019) study, which highlighted augmented reality's (AR) capacity to convert passive learning into an interactive experience. The enhancement in students' understanding of cause-and-effect relationships can be linked to AR's effectiveness in presenting historical events in a spatially and temporally enriched format. This reinforces the statement (Riurean, Olar, Ionică, & Pellegrini, 2020), which found that AR facilitates deeper conceptual understanding by visualizing abstract concepts

4. Conclusion

This study concludes that the incorporation of AR technology in social studies significantly enhances the historical thinking skills of seventh-grade students at SMPN 13 Bandung. The findings reveal a substantial increase in student engagement in social studies by 825%, a 45% boost in conceptual understanding, and a 40% improvement in critical thinking skills. Furthermore, 95% of students expressed a strong interest in the use of AR, while 905 teachers noted an enhancement in students' analytical abilities. Therefore, integrating AR into social studies demonstrates considerable potential to address the limitations of traditional learning methods and foster a deeper, more analytical comprehension of the material concerning the development of Indonesian society during the Hindu and Buddhist eras.

The practical implications of this study include recommendations for educators to incorporate augmented reality (AR) in social studies to enhance student engagement and comprehension. For policymakers, these findings can serve as a foundation for crafting policies that promote the integration of technology in social studies curricula. Additionally, further research is needed to assess the effectiveness of AR across a larger student population and in various educational environments, as well as to examine other factors that may impact the successful implementation of technology in social studies.

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