

The Effectiveness of Virtual Reality Sangiran Museum to Increase the Interest in Learning History of Class X High School Students

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Abstract: Learning interest is a critical factor in determining the success of students' learning. Learning interest can be defined as students' attention and liking for a subject matter, characterized by a strong desire to learn and explore the material. This study aims to measure the effectiveness of learning media Virtual Reality Sangiran Museum in increasing students' interest in learning history. This study uses an experimental method with the One Group Pre-test Post-test Design model involving the same subject, namely 50 class X MA Sunan Pandanaran Yogyakarta students. The instrument used in this research is a questionnaire on students' interest in learning history. The results showed a significant difference in students' interest in learning history before and after using the learning media Virtual Reality Sangiran Museum. The results of the T-Test test showed a significance value of $0.000 < 0.050$, which can be concluded that there is an influence in the use of learning media Virtual Reality Sangiran Museum on students' learning interest. Meanwhile, based on the N-Gain test, the average g score is 0.720, which can be assumed to mean that the learning media of the Virtual Reality Sangiran Museum has an impact with high criteria on increasing students' interest in learning. This study concludes that using learning media, such as the Virtual Reality Sangiran Museum, in learning history effectively increases students' interest in learning history.

Keywords: history learning; learning interest; Sangiran museum; virtual reality

Abstrak: Minat belajar merupakan faktor penting dalam menentukan keberhasilan belajar siswa. Minat belajar dapat didefinisikan sebagai perhatian dan kesukaan siswa terhadap suatu materi pelajaran, yang ditandai dengan keinginan kuat untuk belajar dan mengeksplorasi materi tersebut. Penelitian ini bertujuan untuk mengukur efektivitas media pembelajaran Virtual Reality Museum Sangiran dalam meningkatkan minat belajar siswa dalam mempelajari sejarah. Penelitian ini menggunakan metode eksperimental dengan model desain Pre-test Post-test Satu Kelompok yang melibatkan subjek yang sama, yaitu 50 siswa kelas X MA Sunan Pandanaran Yogyakarta. Instrumen yang digunakan dalam penelitian ini adalah kuesioner tentang minat belajar siswa dalam mempelajari sejarah. Hasil penelitian menunjukkan adanya perbedaan signifikan dalam minat belajar siswa dalam mempelajari sejarah sebelum dan setelah menggunakan media pembelajaran Virtual Reality Museum Sangiran. Hasil uji T menunjukkan nilai signifikansi $0,000 < 0,050$, yang dapat disimpulkan bahwa terdapat pengaruh penggunaan media pembelajaran Virtual Reality Museum Sangiran terhadap minat belajar siswa. Sementara itu, berdasarkan uji N-Gain, skor g rata-rata adalah 0,720, yang dapat diasumsikan berarti bahwa media pembelajaran Museum Sangiran Realitas Virtual memiliki dampak dengan kriteria tinggi dalam meningkatkan minat belajar siswa. Studi ini menyimpulkan bahwa penggunaan media pembelajaran, seperti Museum Sangiran Realitas Virtual, dalam

pembelajaran sejarah secara efektif meningkatkan minat belajar siswa dalam mempelajari sejarah.

Kata Kunci: minat belajar; museum Sangiran; pembelajaran sejarah; realitas virtual



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Introduction

Education is one of the critical factors in developing quality human resources. In the formal education system in Indonesia, the role of Senior High Schools is crucial in preparing young people to continue their education or enter the workforce. At the senior high school level, students are equipped with various knowledge and skills, including the attitudes needed to succeed in the future. However, according to data from the PISA (Program for International Student Assessment), the performance of students in Indonesia in science, mathematics, and reading ranks low compared to other countries. One of the causes of this low performance is students' need for more motivation and interest in learning subject matter delivered by conventional methods (OECD, 2019). This condition is a big challenge in the learning process because the low interest of students in learning also can potentially reduce students' learning achievements. Research conducted by Faisah et al. (2023) and Putri & Safrizal (2023) have shown that students' intrinsic motivation towards learning greatly influences their academic achievement.

Learning interest is a critical factor that determines the success of the educational process. According to one study, interest in learning can be defined as students' attention and liking for a subject matter, which is characterized by a strong desire to learn and explore the material (Mesra & Kuntarto, 2021; Muliani & Arusman, 2022). Recent studies have shown that students' interest in learning in Indonesia, especially at the senior high school level, still needs to be higher. Research conducted by Riga (2020) and Korompot et al. (2020) show that factors such as learning methods that are less varied, lack of utilization of technology in the teaching-learning process, and subject matter that is considered less attractive are some of the causes of low student interest in learning.

The subject of history is often seen as one of the less exciting materials for students. The main difficulty in learning history lies in the perception that historical material contains factual memorization, such as important dates and events, without any deep understanding or explicit connection to students' daily lives (Pramayogi et al., 2019; Rahmawati et al., 2023). The monotony of delivering the material, often through lectures and textbook readings, exacerbates the situation. As a result, many students are less enthusiastic, feel bored, and have no desire to explore history lessons. It is essential to understand that the subject of history has a vital role in shaping students' character and national insight. History serves as a record of past events and a tool to build national identity, strengthen national values, and understand the social, cultural, and political dynamics that shape a nation. Through understanding history, students can develop a critical attitude towards the times and learn valuable lessons to face future challenges (Handy, 2021; Purni, 2023). History, with all its complexities, has the potential to be an exciting and in-depth subject if delivered with the right approach.

Innovative learning strategies and media are needed to stimulate students' interest in learning. Teachers are critical in creating an interactive and relevant classroom atmosphere as learning facilitators. Innovations in learning methods, such as digital technology, multimedia, and project-based learning, have increased students' interest in history materials. Research

conducted by Gama et al. (2022) and Yilmaz (2021) shows that the development and application of technology in the learning process can increase learner engagement, enrich the learning experience, and increase learner motivation and interest. One of the technological innovations that is becoming widely applied in the world of education is Virtual Reality (VR) technology. The technology offers an interactive experience that allows users to experience real-world simulations in virtual form, thus providing a more immersive learning experience. The use of virtual reality in learning has the potential to enrich traditional teaching methods and provide appeal to increase students' motivation and interest in learning. Virtual Reality in learning history allows learners to “visit” historical places without leaving the classroom.

One of the Virtual Reality aligned with learning history in class X high school is the Virtual Reality Sangiran Museum provided by the Ministry of Education and Culture. Sangiran Museum is one of the most important archaeological sites in Southeast Asia, which stores a collection of historical artifacts and evidence related to the evolution of early humans and past cultures. Sangiran Museum is essential in historical education, especially in understanding the development of human civilization in Southeast Asia (Hermanto, 2020; Marfuah et al., 2020). Visiting the Sangiran Museum directly is often constrained by distance, time, and cost, so not all students can learn directly at the museum. Therefore, virtual reality technology at the Sangiran Museum is a potential innovation. The use of virtual reality-based learning media allows students to 'visit' the Sangiran Museum virtually and see firsthand the existing artifact collections without having to travel to the museum's physical location. Thus, students can still get a deep understanding of historical material related to the evolution of early humans.

Virtual Reality in education has shown positive impacts in various learning contexts. Based on research conducted by Bahroni et al. (2024), Conrad et al. (2024), and Refdinal et al. (2023) show that the use of Virtual Reality can increase learner engagement in the learning process because the technology provides a more in-depth learning experience through simulation and direct interaction with the object being studied. Virtual Reality also allows learners to explore concepts that are difficult to understand through text or two-dimensional images, such as human evolution or geological processes, in a more intuitive and fun way. Virtual reality-based learning media also encourages learners to participate in teaching-learning actively. The technology facilitates cognitive understanding and provides sensory experiences that enhance long-term memory and concept understanding (Haryana et al., 2022; Setiawan et al., 2022). Virtual Reality can create a more exciting and enjoyable learning atmosphere, and students can visualize abstract concepts that are difficult to understand only through oral explanations. Based on research conducted by Merchant et al. (2014), students who learn using Virtual Reality have better motivation and interest in learning when compared to learning using conventional learning media.

There are several studies related to this topic, namely: (1) Bahroni et al. (2024), titled “The Effectiveness of the Youth Pledge Museum’s Virtual Reality in Increasing the Historical Awareness of 11th-Grade High School Students,” which used a quantitative method to examine the effectiveness of the Youth Pledge Museum’s Virtual Reality in enhancing the historical awareness of 11th-grade students at Jepara State High School 1. (2) Rasyida et al. (2023), in their study titled “Metaverse-Based Learning—Virtual Reality Using Spatial.io with the Discovery Learning Model to Improve Students’ Understanding and Interest,” employed a quasi-experimental method to test the effectiveness of Virtual Reality media in enhancing students’ interest and understanding. (3) Setiawan et al. (2022), in their study titled “Historical Interactive Virtual Reality Learning in College,” used an R&D method to develop a Virtual Reality simulation of the Diponegoro War and tested its feasibility and effectiveness in supporting the history learning experience in the History Education Program at Yogyakarta

State University. (4) Haryana et al. (2022), in their study titled “A Systematic Review of Immersive Virtual Reality Applications for Higher Education: Design Elements, Lessons Learned, and Research Agenda,” used an experimental method to examine the effectiveness of Virtual Reality media in improving student learning outcomes. These four studies demonstrate the positive impact of virtual reality on learning. However, based on the findings of these four studies, no study has yet to specifically examine the effectiveness of the Sangiran Virtual Reality Museum in increasing students’ interest in learning.

Based on the explanation above, this study examines the effectiveness of using virtual reality (VR) learning media at Sangiran Museum in increasing the interest in learning history for class X high school students. This research is necessary considering the low interest of students in studying history, which is often considered monotonous, memorized material and less relevant to everyday life. The urgency of this research is based on the need to find innovative solutions in the history learning process. Amid an increasingly advanced digital era, technology such as VR allows the delivery of subject matter more contextually. This research is expected to make a practical contribution to developing more innovative and effective history-learning media. Furthermore, this research is expected to provide an overview of the potential of Virtual Reality technology in improving the quality of learning in schools, especially in arousing students' interest in learning, which affects students' academic results.

Research Methods

This research uses an experimental method to determine the cause-and-effect relationship between the independent and dependent variables. Through the experimental method, researchers give specific treatments to the object under study and then analyze the effect of the treatment on the measured results. This research specifically uses One Group Pretest-Posttest Design, an experiment using one group of subjects. Measurements are taken twice, namely before treatment (pretest) to obtain initial data and after treatment (posttest) to see changes from the treatment. The advantage of the One Group Pretest-Posttest Design is its ability to directly measure changes that occur in one group of subjects so that the study results can be easily compared between the conditions before and after treatment. A statistical difference test, such as the t-test, was used to analyze the data obtained from the pretest and posttest. The t-test tests statistically significant differences between two conditions before and after treatment. In this study, the t-test was used to analyze the significant impact of the use of Virtual Reality Sangiran Museum learning media on students' interest in learning. Quantitative data analysis methods were used in this study. To determine the effect of learning media Virtual Reality Sangiran Museum on students' interest in learning using the independent sample t-test with the SPSS version 26.0 program.

Table 1. One Group Pre-test and Post-test Design

Before	Treatment	After
O ₁	X	O ₂

Source: Sugiyono (2019)

Information:

O₁ : Pre-test (interest in learning before treatment)

X : Post-test (interest in learning after treatment)

O₂ : The treatment applied using learning media Virtual Reality Sangiran Museum

This study involved 50 grade X students at MA Sunan Pandanaran Yogyakarta, which consisted of two classes, namely classes X A and X B. The 50 students will be involved in applying and evaluating the use of learning media Virtual Reality Museum Sangiran. The

influence of the media is tested using the t-test with independent sample t-test, and to determine its significance to learning interest is done with the N-Gain test. This study assumes that the value obtained is in the medium or high range, so the media used effectively increases students' interest in learning. Conversely, if the value obtained is low, the media is ineffective in increasing the interest in learning. The N-Gain criteria formulated by Richard Hake (1999) are used to determine the impact of using the Virtual Reality Sangiran Museum on students' interest in learning, as presented in Table 2.

Table 2. Criteria of N-Gain Score

Intervals	Criteria
$g \geq 0.710$	High
$0.310 \leq g \leq 0.700$	Medium
$g \leq 0.300$	Low

Source: Sugiyono (2019)

The instrument used in this study consisted of 20 statement items. The data in this study were collected through pretest and posttest activities. The assessment indicators of the instrument consist of (i) students' involvement in learning history, (ii) students' interest in historical material, (iii) students' understanding of historical material through the use of learning media, (iv) students' motivation to learn history based on the use of learning media, (v) students' satisfaction with the use of historical learning media, (vi) the effect of learning media on improving students' historical learning outcomes, and (vii) students' ease of accessing and using learning media presented in Table 3.

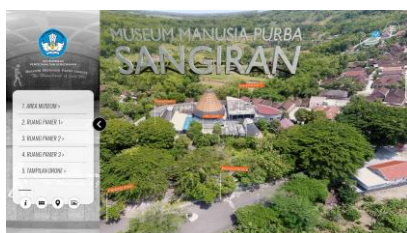
Table 3. Indicator Questions

No	Indicator Questions	Questions Number
1	students' involvement in learning history	1, 2, 3
2	students' interest in historical material	4, 5, 6
3	students' understanding of historical material through the use of learning media	7, 8, 9
4	students' motivation to learn history based on the use of learning media	10, 11, 12
5	students' satisfaction with the use of historical learning media	13, 14, 15
6	the effect of learning media on improving students' historical learning outcomes	16, 17
7	students' ease of accessing and using learning media	18, 19, 20

Research Result

Research Data

The following is a learning media: Virtual Reality Sangiran Museum, which aims to increase students' interest in learning. Virtual Reality Pleret Museum is a production of the Ministry of Education and Culture of the Republic of Indonesia, which researchers utilize to support history learning, significantly increasing the learning interest of class X high school students.



(a) Home Page and Exploration Menu



(b) Diorama Section of Sangiran Museum



(c) Information Popup Feature

Figure 1. Virtual Reality Learning Media Sangiran Museum
Source: Research Data, 2025

Validity Test Result

The validity test refers to suitability or accuracy, which indicates the extent to which a measurement instrument can accurately measure what should be measured or the extent to which the instrument achieves its objectives. The product moment correlation coefficient introduced by Pearson is used to measure the validity of the instrument items. The validity of the question items was analyzed by comparing the calculated r -value with the table value of r Product Moment at the 5% significance level, with a sample of 50 ($N = 50$). A question item is declared valid if the calculated r value is greater than the critical value of the r table. Conversely, the item is declared invalid if the calculated r value is smaller than the r table.

Table 4. Criteria of N-Gain Score

Question Number	R-Value	R-Table	Category	Question Number	R-Value	R-Table	Category
1	0.301	0.279	Valid	11	0.326	0.729	Valid
2	0.457			12	0.411		
3	0.321			13	0.309		
4	0.311			14	0.426		
5	0.381			15	0.431		
6	0.420			16	0.299		
7	0.280			17	0.307		
8	0.455			18	0.407		
9	0.362			19	0.321		
10	0.454			20	0.445		

Source: Research Data, 2025

The data analysis shows that each question item from the research instrument is valid for use in research. This is based on the results of the R Count value of the 20 question items more significant than the R Table set at 0.279.

Reliability Test Results

Reliability can be interpreted as consistency, a condition of an instrument that can produce the same score or value when used to measure a condition. The reliability of an instrument is expressed by a correlation coefficient, which means that the greater the coefficient value (r) of an instrument, the more reliable the instrument is in measuring a condition. Reliability aims to show that the instruments researchers have prepared can be trusted for data collection. The reliability of the research instrument was measured using Cronbach's Alpha. If the measurement results obtained a score of more than 0.50, the instrument is considered

reliable, and vice versa. The instrument is unreliable if the measurement results obtained a score of less than 0.50.

Table 5. Realibility Test Results

Cronbach's Alpha	N of Item
0.787	50

Source: Research Data, 2025

The Cronbach's Alpha test results obtained a Cronbach's Alpha score 0.787, more than 0.50. This shows that the instruments used by researchers are reliable.

Normality Test Results

The normality test aims to determine the distribution of data obtained from the Sangiran Museum Virtual Reality learning media trial results. The normality test is the basis for determining the statistical methods and approaches used to analyze the effectiveness of the learning media. If the data is normally distributed, the t-test is used. The normality test was carried out using the Kolmogorov-Smirnov method with the help of a computer program, namely SPSS version 26.0. The conclusion of the test is done by comparing the significance value of the calculation results. If the sig value. > 0.050, it can be concluded that the data is usually distributed, and if the sig value is. <0.050, then the data is not normally distributed.

Table 6. Normality Test Results

No	Data	Significance	Information
1	Pre-test Result	0.175	Normal
2	Post-test Result	0.198	Normal

Source: Research Data, 2025

The normality test results obtained a score of 0.175 for the pretest data and 0.198 for the post-test data. This score shows a sig value > 0.050, which can be concluded that the data from the pretest and post-test results are normally distributed. Thus, the effectiveness test uses parametric statistics as a t-test.

Homogeneity Test Results

After the data normality test is carried out, the next stage is to conduct a homogeneity test on the research data obtained. The homogeneity test assesses the similarity of the subjects or groups involved in the application of the Sangiran Museum Virtual Reality learning media. The conclusion refers to the significance value (sig.) resulting from the test using the Levene Statistic method. If the sig value > 0.05, then the data is said to be homogeneous. The results of the homogeneity test are as follows:

Table 7. Homogeneity Test Results

No	Data	Significance	Information
1	Pre-test Result	0.175	Normal
2	Post-test Result	0.198	Normal

Source: Research Data, 2025

Based on the table above, the F-Count value in the pretest data class is 0.234, with a significant value of 0.675, and the F-Count value in the posttest data class is 1.177, with a significant value of 0.345. From these data, the significance value of the pretest and posttest is

more significant than 0.05 (sig. > 0.05). Thus, the data in this study have homogeneous variations.

Effectiveness Test Results

The effectiveness test was conducted to answer this study's hypothesis, namely whether there was a significant difference in students' interest in learning before and after using the learning media Virtual Reality Sangiran Museum. The effectiveness test analysis compared the average results of students' learning interests before and after using the learning media using the t-test method. The conclusion refers to the significance value, namely sig <0.050 at the 5% significance level.

Table 8. Effectiveness Test Results

T-Test Result	Significance
Of the Independent Sample Test	0.000

Source: Research Data, 2025

Based on the table, it is known that the significance value of the T-test results is 0.000. Thus, the significance value of 0.000 <0.050 can be interpreted as a difference in students' interest in learning before and after using the Virtual Reality Museum Sangiran as a learning medium. From these conditions, it is concluded that the use of learning media Virtual Reality Sangiran Museum significantly affects the learning outcomes of class X students at MA Sunan Pandanaran Yogyakarta. Therefore, using learning media, such as the Virtual Reality Sangiran Museum, effectively increases students' interest in learning history.

The next stage, the N-Gain test, was carried out to determine the increase in students' interest in learning with reference to each indicator. The results of the N-Gain test are as follows:

Table 3. Indicator Questions

No	Indicator Questions	N-Gain Score	Criteria
1	students' involvement in learning history	0.746	High
2	students' interest in historical material	0.733	High
3	students' understanding of historical material through the use of learning media	0.746	High
4	students' motivation to learn history based on the use of learning media	0.720	High
5	students' satisfaction with the use of historical learning media	0.679	Medium
6	the effect of learning media on improving students' historical learning outcomes	0.730	High
7	students' ease of accessing and using learning media	0.692	Medium
Average		0.720	High

Source: Research Data, 2025

Based on the table above, the N-Gain test results obtained an average score of 0.720 with "High" criteria. These results suggest that the use of learning media, Virtual Reality Sangiran Museum, can increase students' interest in learning. Thus, it can be concluded that learning media is effective for increasing the learning interest of class X students at MA Sunan Pandanaran Yogyakarta.

Discussion

As described above, the research results show that the Virtual Reality Sangiran Museum used as learning media has high validity, reliability, and practicality, so it becomes an effective tool in increasing students' interest in learning history. The results of the homogeneity test obtained data that the pre-test value has an F value of 0.234 with a significance value of 0.675, and the post-test value has an F value of 1.177 with a significance value of 0.345. From these results, it is concluded that the data variation in this study is homogeneous. In the next stage, the effectiveness test was carried out using the t-test to compare students' interest in learning history before and after using the learning media Virtual Reality Sangiran Museum. The results of the T-test obtained a significance value of 0.000, which means that there is a significant difference in students' interest in learning history before and after using the learning media Virtual Reality Museum Sangiran. The increase in students' interest in learning history is reinforced by the results of the N-Gain Test, which obtained a score of 0.72, included in the "High" criteria. Referring to the results of this study, it can be concluded that the learning media Virtual Reality Sangiran Museum effectively increases students' interest in learning history at MA Sunan Pandanaran Yogyakarta. This study's results align with research conducted by Hendrayana et al. (2022) and Bahroni et al. (2024), which revealed that the use of virtual reality can increase students' interest in learning. Thus, virtual reality has been proven effective as a learning media that can increase students' interest in learning.

These results are supported by research conducted Bahroni et al. (2024), Sasmita et al. (2022), and Setiawan et al. (2022), which states that Virtual Reality learning media is feasible to use to support the success of the history learning process in Senior High Schools and Equivalent. In addition, using history learning media based on Virtual Reality technology provides convenience for teachers in delivering material to students (Azizi et al., 2023; Rachmawati & Hermawan, 2024). In a broader scope, using Virtual Reality learning media in history subjects has several uses. First, Virtual Reality-based history learning media can increase the active participation of students in the learning process (Afwan, 2023; Conrad et al., 2024). Second, Virtual Reality can improve students' knowledge and thinking skills (Fadzil et al., 2020; Ofianto et al., 2023; Wardhana et al., 2019). Reflecting on this explanation, it appears that Virtual Reality as a history learning media can increase students' interest in learning history, which also positively impacts the achievement or learning outcomes of students' history.

In history learning, learners' interest in learning is significant because history is often considered less exciting than other subjects, such as science or math. Several studies have shown that students with high interest in learning tend to have higher understanding and academic achievement than those with low interest in learning (Hernadi, 2021; Khaerunnisa et al., 2018; Maman, 2018). Research conducted by Rosinta et al. (2023), and Agustiningtyas & Surjanti (2021), shows that high learning interest significantly correlates with improved learning outcomes in various disciplines, including history. In further explanation, research conducted by Wibowo (2023), Insani et al. (2023), Hutaaruk et al. (2022), dan Muhammad et al. (2023), revealed that the application of interactive and contextual learning methods and media can increase students' interest in learning which has a positive impact on students' learning outcomes. Thus, the results of research on learning media Virtual Reality Sangiran Museum, which can effectively increase students' interest in learning, can also be a solution to improve student's learning outcomes because interest and learning outcomes correlate.

The development of learning media by utilizing Virtual Reality technology can have a positive impact on the understanding of concepts and increase students' interest in learning (Dianta et al., 2023; Mihelj et al., 2016; Pramesti et al., 2022). Using Virtual Reality for learning encourages students to be interested and motivated to learn history. Students can virtually see

and observe historical objects, usually only explained through text or two-dimensional images. Virtual reality technology for learning history creates a more conducive learning environment because it allows students to learn at their own pace and learning style. In the context of Virtual Reality Museum Sangiran, students can see artifacts in the form of pre-historic relics and visit the museum virtually, which in turn can increase students' understanding and involvement in learning history.

Conclusion

The results showed that the use of learning media, such as the Virtual Reality Sangiran Museum, in learning history significantly affects students' interest in learning history. The results of the T-Test test obtained a sig. Score $0.000 < 0.050$, and the N-Gain test obtained the average score $g > 0.710$, namely $g = 0.720$. These results indicate increased students' interest in learning history with "High" criteria. The discussion results can conclude that Virtual Reality as a history learning media effectively increases students' interest in learning history. These results align with previous research, which reveals that virtual reality can increase interest in learning and positively correlate with increased knowledge and students' historical thinking skills. However, the use of Virtual Reality in learning history has limitations, such as not all materials can be accommodated with this technology, and accessibility to Virtual Reality media depends on the specifications of the device used. Therefore, further consideration is needed so that the use of Virtual Reality in learning history still provides students a better, holistic, and comprehensive learning experience.

References

- Afwan, B. (2023). Pengembangan Media Pembelajaran Virtual Reality Berbasis Museum Klinik Santa Maria Kota Metro pada Materi Sejarah SMA. *Tarikhuna: Journal of History and History Education*, 5(1), 13–24. <https://doi.org/10.15548/thje.v5i1.6095>.
- Agustiningtyas, P., & Surjanti, J. (2021). Peranan Teman Sebaya dan Kebiasaan Belajar Terhadap Hasil Belajar Melalui Motivasi Belajar di Masa Covid-19. *Eduaktif: Jurnal Ilmu Pendidikan*, 3(3), 794–805. <https://doi.org/10.31004/edukatif.v3i3.454>.
- Azizi, H., Madjid, I., & Ismail, N. (2023). Virtual Tour as an Alternative to Tourism During Covid-19: A Case Study at The Aceh Tsunami Museum. *International Journal of Educational Review, Law and Social Sciences (IJERLAS)*, 3(4), 1305–1318. <https://doi.org/10.54443/ijerlas.v3i4.977>.
- Bahroni, A., Setiawan, R., Fitrianti, V. V., & Nugroho, A. N. P. (2024). The Effectiveness of Virtual Reality of The Youth Pledge Museum to Increase The Historical Awareness of Class XI Senior High School Students. *Jurnal Eduscience*, 11(3), 532–545. <https://doi.org/10.36987/jes.v11i3.6466>.
- Conrad, M., Kablitz, D., & Schumann, S. (2024). Learning Effectiveness of Immersive Virtual Reality in Education and Training: A Systematic Review of Findings. *Computers & Education: X Reality*, 4, 100053. <https://doi.org/10.1016/j.cexr.2024.100053>.
- Dianta, A. F., Devi, C., Sarinastiti, W., & Akbar, Z. F. (2023). Media Pembelajaran Interaktif Berbasis Virtual Reality Menggunakan Video 360°. *POSITIF: Jurnal Sistem Dan Teknologi Informasi*, 9(1), 21–28. <https://doi.org/10.31961/positif.v9i1.1560>.
- Fadzil, N. A. S. N. M., Lah, H. A., & Mustafa, W. A. (2020). The Usage of Virtual Reality Technology Through Histopology Application to Increase Orang Asli Imagination Skill

- in History. *Journal of Physics: Conference Series*, 1529(4), 042065. <https://doi.org/10.1088/1742-6596/1529/4/042065>.
- Faisah, E., Padilah, E., & Patras, Y. E. (2023). Pengaruh Minat Belajar dan Kedisiplinan Belajar Siswa Terhadap Hasil Belajar Matematika. *Jurnal Manajemen Pendidikan*, 11(1), 006–013. <https://doi.org/10.33751/jmp.v1i1.7698>.
- Gama, L. C., Chipeta, G. T., & Chawinga, W. D. (2022). Electronic learning benefits and challenges in Malawi's higher education: A literature review. *Education and Information Technologies*, 27(8), 11201–11218. <https://doi.org/10.1007/s10639-022-11060-1>.
- Handy, M. R. N. (2021). Pembelajaran Sejarah Dalam Membangun Historical Awareness dan Sikap Nasionalisme Pada Peserta Didik. *Prabayaksa: Journal of History Education*, 1(1), 49. <https://doi.org/10.20527/prb.v1i1.2196>.
- Haryana, M. R. A., Warsono, S., Achjari, D., & Nahartyo, E. (2022). Virtual Reality Learning Media with Innovative Learning Materials to Enhance Individual Learning Outcomes Based on Cognitive Load Theory. *The International Journal of Management Education*, 20(3), 100657. <https://doi.org/10.1016/j.ijme.2022.100657>.
- Hendrayana, D., Rahmah, N. A., Ariatama, A., & Tobing, S. H. L. (2022). Studi Literatur: Pemanfaatan Virtual Reality sebagai Media Pembelajaran dan Uji Kompetensi untuk Industri Perfilman. *Jurnal Seni Nasional Cikini*, 8(2), 71–78. <https://doi.org/10.52969/jsnc.v8i2.158>.
- Hermanto, W. (2020). Pembelajaran Sejarah di Sma melalui Program Sangiran Masuk Sekolah. *Jantra*, 15(1), 71–80. <https://doi.org/10.52829/jantra.v15i1.134>.
- Hernadi, E. (2021). Upaya Meningkatkan Minat dan Prestasi Belajar Sejarah Pada Siswa Kelas XII IPS 1 SMAN 1 Cikijing Melalui Pembelajaran Kontekstual Berbasis Masalah. *Bihari: Jurnal Pendidikan Sejarah dan Ilmu Sejarah*, 4(1). <https://jurnal.unsil.ac.id/index.php/bihari/article/view/3203>.
- Hutauruk, A. F., Subakti, H., Simarmata, J., Soputra, D., Lestari, H., Al-Haddar, G., Da'i, M., Purba, S., Khalik, M. F., & Cahyaningrum, V. D. (2022). *Media Pembelajaran dan TIK*. Yayasan Kita Menulis.
- Insani, I. D. O. N., Firdaus, R. A., Pradana, H. D., Santoso, A. R. W., & Dermawan, D. A. (2023). Penggunaan Pengembangan Virtual Reality Scratch sebagai Media Pembelajaran. *Jurnal Informatika dan Teknologi Komputer (J-ICOM)*, 4(2), 72–77. <https://doi.org/10.33059/j-icom.v5i01.7543>.
- Khaerunnisa, F., Sunarjan, Y., & Atmaja, H. T. (2018). Pengaruh Penggunaan Media Power Point Terhadap Minat Belajar Sejarah Siswa Kelas X SMA Negeri 1 Bumiayu Tahun Ajaran 2017/2018. *Indonesian Journal of History Education*, 6(1), 31–41.
- Korompot, S., Rahim, M., & Pakaya, R. (2020). Persepsi Siswa Tentang Faktor yang Mempengaruhi Minat Belajar. *JAMBURA: Guidance and Counseling Journal*, 1(1), 40–48. <https://doi.org/10.37411/jgcj.v1i1.136>.
- Maman, M. (2018). Sikap Cara Belajar dan Prestasi Belajar. *Faktor: Jurnal Ilmiah Kependidikan*, 5(1), 49–58.
- Marfuah, S., Azmi, M., Nur, M. M., Yusran, Y., & Prameswara, A. P. (2020). Integrasi Situs Sejarah di Samarinda dan Balikpapan dalam Pembelajaran Sejarah Lokal. *Yupa: Historical Studies Journal*, 4(2), 73–81. <https://doi.org/10.30872/yupa.v4i2.319>.

- Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. *Computers & Education*, 70, 29–40. <https://doi.org/10.1016/j.compedu.2013.07.033>.
- Mesra, P., & Kuntarto, E. (2021). Faktor–Faktor Yang Mempengaruhi Minat Belajar Siswa di Masa Pandemi. *Jurnal Ilmiah Wahana Pendidikan*, 7(3), 177–183. <https://doi.org/10.5281/zenodo.5037881>.
- Mihelj, M., Novak, D., & Beguš, S. (2016). *Virtual Reality Technology and Applications* (Vol. 68). Springer Netherlands. <https://doi.org/10.1007/978-94-007-6910-6>.
- Muhammad, M. A., Pratama, M., Utaminingtyas, I. W., Sulistiono, W. E., Martinus, Djausal, G. P., Mardiana, Herlinawati, Despa, D., & Khotimah, S. N. (2023). Virtual Reality Warisan Sejarah Lampung: Pengalaman Interaktif dan Edukatif di Desa Negeri Katon. *Nemui Nyimah*, 3(1). <https://doi.org/10.23960/nm.v3i1.59>.
- Muliani, R. D., & Arusman, A. (2022). Faktor - Faktor yang Mempengaruhi Minat Belajar Peserta Didik. *Jurnal Riset Dan Pengabdian Masyarakat*, 2(2), 133–139. <https://doi.org/10.22373/jrpm.v2i2.1684>.
- OECD. (2019). *PISA 2018 Results (Volume I): What Students Know and Can Do* (Volume I). OECD Publishing. <https://doi.org/10.1787/5f07c754-en>.
- Ofianto, O., Erniwati, E., Fitriasia, A., Ningsih, T. Z., & Mulyani, F. F. (2023). Development of Online Local History Learning Media Based on Virtual Field Trips to Enhance the Use of Primary Source Evidence. *European Journal of Educational Research*, 12(2), 775–793. <https://doi.org/10.12973/eu-jer.12.2.775>.
- Pramayogi, I., Nirmala P, R. P., & Hartanto, W. (2019). Inovasi Pembelajaran Sejarah. *SINDANG: Jurnal Pendidikan Sejarah dan Kajian Sejarah*, 1(2), 17–22. <https://doi.org/10.31540/sdg.v1i2.257>.
- Pramesti, A. A., Sitompul, R. P., Sopiya, N., & Fitroh. (2022). Systematic Literature Review: Pemanfaatan Virtual Reality (VR) Sebagai Alternatif Pembelajaran. *Jurnal Pendidikan Teknologi dan Kejuruan*, 19(2), 105–117. <https://doi.org/10.23887/jptkuniksha.v19i2.48027>.
- Purni, T. (2023). Pentingnya Pendidikan Sejarah Sebagai Penguat Pendidikan yang Berkarakter. *Krinok: Jurnal Pendidikan Sejarah dan Sejarah*, 2(1), 190–197. <https://doi.org/10.22437/krinok.v2i1.24723>.
- Putri, F. M., & Safrizal. (2023). Faktor Penyebab Rendahnya Minat Belajar Siswa dalam Pembelajaran Matematika Kelas VI Sekolah Dasar Negeri 12 Baruh-Bukit. *Jurnal Riset Madrasah Ibtidaiyah (JURMIA)*, 3(1), 66–77. <https://doi.org/10.32665/jurmia.v3i1.1346>.
- Rachmawati, M. D., & Hermawan, H. D. (2024, January). Development of virtual tour 360° educational media as Museum introduction media at Radya Pustaka. In *AIP Conference Proceedings* (Vol. 2926, No. 1, p. 020079). AIP Publishing LLC. <https://doi.org/10.1063/5.0183799>.
- Rahmawati, B. F., Hadi, M. S., & Hubaidiyah, H. (2023). Citra Pembelajaran Sejarah dalam Persepsi Siswa. *Jurnal Humanitas: Katalisator Perubahan dan Inovator Pendidikan*, 9(1), 96–109. <https://doi.org/10.29408/jhm.v9i1.7497>.

- Rasyida, R., Nurdin, E. A., & Rasim. (2023). Pembelajaran Berbasis Metaverse – Virtual Reality Menggunakan Spatial.io dengan Model Discovery Learning Untuk Meningkatkan Pemahaman dan Minat Siswa. *Jurnal Pendidikan Tambusai*, 7(2), 15875–15882. <https://doi.org/10.31004/jptam.v7i2.8880>.
- Refdinal, R., Adri, J., Prasetya, F., Tasrif, E., & Anwar, M. (2023). Effectiveness of Using Virtual Reality Media for Students' Knowledge and Practice Skills in Practical Learning. *JOIV: International Journal on Informatics Visualization*, 7(3), 688–694. <https://doi.org/10.30630/joiv.7.3.2060>.
- Riga, A. (2020). Identifikasi Faktor yang Mempengaruhi Motivasi Belajar Sejarah Siswa di Sekolah Menengah Atas. *Journal of Social Knowledge Education (JSKE)*, 1(4), 88–94. <https://doi.org/10.37251/jske.v1i4.361>.
- Rosinta, H., Wibowo, E. W., & Farhurohman, O. (2023). Pengembangan Media Pembelajaran Interaktif Budaya Lokal Banten Berbasis Teknologi Informasi untuk Meningkatkan Minat Belajar Siswa. *Dawuh Guru: Jurnal Pendidikan MI/SD*, 3(1), 13–24. <https://doi.org/10.35878/guru.v3i1.593>.
- Sasmita, I. W. K., Putrama, I. M., & Santyadiputra, G. S. (2022). Pengembangan Virtual Reality Untuk Digitalisasi Mandala 2 di Pura Besakih. *KARMAPATI (Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika)*, 11(1), 1–11. <https://doi.org/10.23887/karmapati.v11i1.39449>.
- Setiawan, R., Nugroho, A. N. P., Hadi, K., Laksana, N. Y., & Widiyanto, H. W. (2022). Historical Interactive Virtual Reality Learning in College. *Harmoni Sosial: Jurnal Pendidikan IPS*, 8(2), 73–79. <https://doi.org/10.21831/hsjpi.v8i2.46831>.
- Sugiyono. (2019). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Alfabeta.
- Wardhana, N. J., Arthana, I. K. R., & Divayana, D. G. H. (2019). Pengembangan Aplikasi Virtual Reality 3D Pengenalan Manusia Purba Bangsa Indonesia untuk SMA Kelas X (Studi Kasus SMA Negeri 2 Singaraja). *Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI)*, 8(2), 109–118. <https://doi.org/10.23887/janapati.v8i2.17714>.
- Wibowo, H. S. (2023). *Pengembangan Teknologi Media Pembelajaran: Merancang Pengalaman Pembelajaran yang Inovatif dan Efektif*. Tiram Media.
- Yilmaz, A. (2021). The Effect of Technology Integration in Education on Prospective Teachers' Critical and Creative Thinking, Multidimensional 21st Century Skills and Academic Achievements. *Participatory Educational Research*, 8(2), 163–199. <https://doi.org/10.17275/per.21.35.8.2>.