

Influence Of Assemblr Edu-Based 3d Learning Media On Students' Geography Learning Interest

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ABSTRACT

The rapid development of information and communication technology has encouraged innovation in digital learning, including Geography education. However, classroom learning still frequently relies on conventional methods, resulting in limited student engagement and low learning interest. This study aims to analyze the effect of three-dimensional learning media based on *Assemblr Edu* on students' interest in learning Geography and to examine their responses to its use. A quantitative approach was employed using a quasi-experimental method with a *nonequivalent control group design*. The sample consisted of 70 tenth-grade students at SMA Gajah Mada Bandar Lampung, divided into experimental and control groups. Data were collected through questionnaires and observation sheets and analyzed using normality, homogeneity, and *Independent Samples t-Test*. The results indicate that *Assemblr Edu* had a positive and significant effect on students' learning interest, with a significance value of $0.002 < 0.05$. Student responses reached 77.14%, categorized as good, indicating its effectiveness in supporting more engaging and interactive Geography learning.

Key Words: Assemblr Edu; 3D Learning Media; Learning Interest; Geography Learning.

ABSTRAK

Perkembangan teknologi informasi dan komunikasi mendorong inovasi pembelajaran digital, termasuk dalam pembelajaran Geografi. Namun, proses pembelajaran di sekolah masih sering menggunakan metode konvensional sehingga keterlibatan dan minat belajar siswa relatif rendah. Penelitian ini bertujuan menganalisis pengaruh media pembelajaran tiga dimensi berbasis *Assemblr Edu* terhadap minat belajar Geografi serta respons siswa terhadap penggunaannya. Penelitian menggunakan pendekatan kuantitatif dengan metode kuasi eksperimen dan desain *nonequivalent control group design*. Sampel terdiri atas 70 siswa kelas X SMA Gajah Mada Bandar Lampung yang dibagi menjadi kelas eksperimen dan kelas kontrol. Data dikumpulkan melalui angket dan lembar observasi, kemudian dianalisis menggunakan uji normalitas, homogenitas, dan *Independent Samples t-Test*. Hasil penelitian menunjukkan bahwa *Assemblr Edu* berpengaruh positif dan signifikan terhadap minat belajar siswa dengan nilai signifikansi $0,002 < 0,05$. Respons siswa mencapai 77,14% dalam kategori baik. Media ini efektif meningkatkan minat belajar melalui visualisasi objek tiga dimensi yang lebih konkret, menarik, interaktif, dan mudah dipahami.

Kata Kunci: *Assemblr Edu*; Media Pembelajaran 3D; Minat Belajar; Pembelajaran Geografi.

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INTRODUCTION

The rapid development of information and communication technology has brought significant changes to various aspects of life, including education. The integration of technology into learning provides opportunities for educators to create more engaging, interactive, and effective learning experiences. According to Pagarra et al. (2022), learning media serve as a means of delivering information that helps students understand learning materials more easily. Daniyati et al. (2023) explained that the appropriate use of learning media can improve the quality of interaction between teachers and students during the learning process. Therefore, the integration of technology into learning has become an essential requirement for improving educational quality in the digital era.

Learning media play a strategic role in supporting the success of the learning process. Nisaurasyidah et al. (2021) stated that learning media function as instructional tools that facilitate the delivery of learning materials to students. Meanwhile, Silahuddin (2022) explained that learning media not only serve as information delivery tools but also enhance students' attention and engagement in learning activities. Nurfadhillah et al. (2021) further emphasized that the use of attractive learning media can increase students' learning interest, making the learning process more effective and meaningful.

Learning interest is one of the internal factors that influence students' success in achieving learning objectives. Furqon (2020) defined learning interest as an individual's tendency to pay attention to and actively engage in learning activities voluntarily. According to Rahman (2021), students with high learning interest tend to be more active, enthusiastic, and motivated during the learning process. Setiawan et al. (2022) also found that learning interest has a positive relationship with students' academic achievement. Conversely, low learning interest may lead to passive participation and limited understanding of the learning materials.

The issue of low learning interest remains a challenge in Geography education. Pramita et al. (2024) explained that low learning interest may result from the use of monotonous and less varied teaching methods. Trisnawati and Fauziya (2024) stated that learning boredom often occurs when students only receive information passively without engaging learning experiences. Leniawati et al. (2023) also revealed that students frequently experience difficulties in understanding Geography concepts due to uninteresting material presentation and the limited use of appropriate learning media. Such conditions reduce students' enthusiasm for learning and contribute to low learning interest.

One effort to enhance students' learning interest is through the use of three-dimensional (3D) learning media. Purba and Sarminta (2021) explained that 3D visual media can present objects more realistically, thereby helping students understand abstract concepts. Rohmatulloh et al. (2022) stated that technology-based 3D learning media can improve students' learning experiences through more attractive and interactive visualizations. Akbar et al. (2024) further emphasized that 3D learning media can increase student engagement during the learning process by providing more concrete learning experiences compared to conventional media.

The development of educational technology has led to the emergence of various three-dimensional learning platforms, one of which is Assemblr Edu. Chairudin et al. (2023) explained that Assemblr Edu is a learning platform that integrates three-dimensional objects and Augmented Reality (AR) technology to support educational activities. Fitriannor et al. (2024) stated that Assemblr Edu enables students to learn independently through more engaging and interactive material visualizations. Mutmainna et al. (2024) added that the platform is relatively easy for both teachers and students to use, making it a potentially effective learning medium for classroom instruction.

Several previous studies have demonstrated the positive impact of Assemblr Edu on learning outcomes. Ahmad et al. (2022) found that Assemblr Edu-assisted learning media improved secondary school students' academic achievement. Lestari et al. (2023) also reported that the use of Assemblr Edu contributed to improved learning outcomes in vocational education. Furthermore, Lino Padang et al. (2021) showed that Assemblr Edu-based Augmented Reality media enhanced students' learning motivation. Masri et al. (2023) even found that Augmented Reality learning media developed using Assemblr Edu positively influenced junior high school students' learning interest. These findings indicate that Assemblr Edu has considerable potential to improve learning quality.

Nevertheless, most previous studies have focused on learning outcomes or learning motivation and were conducted in different subjects and educational levels. Research examining the effect of Assemblr Edu-based 3D learning media on students' learning interest in Geography at the senior high school level remains limited. In addition, studies specifically investigating the use of Assemblr Edu in hydrosphere-related learning materials are still scarce. Therefore, a research gap exists regarding the effectiveness of Assemblr Edu-based 3D learning media in enhancing students' learning interest in Geography education.

Based on this research gap, the novelty of the present study lies in the implementation of Assemblr Edu-based 3D learning media for hydrosphere materials among tenth- grade senior high school students and the examination of its effect on students' learning interest within the context of Geography education. Hydrosphere material was selected because it contains concepts and processes that require visualization to facilitate students' understanding. Therefore, this study aimed to determine the effect of Assemblr Edu-based 3D learning media on the learning interest of tenth-grade students in Geography at SMA Gajah Mada Bandar Lampung and to identify students' responses toward the implementation of the media in the learning process.

METHOD

Research Design

This study employed a quantitative approach using a quasi-experimental method. According to Sugiyono (2023), quantitative research is a method used to test specific theories through the measurement of research variables and statistical data analysis. The quantitative approach was selected because this study aimed to examine the effect of Assemblr Edu-based

3D learning media on students' learning interest in Geography. The quasi-experimental method was applied because the researcher was unable to randomly assign participants to research groups; therefore, existing classes were used as the experimental and control groups (Hardani et al., 2020; Sugiyono, 2023).

The research design used was the Nonequivalent Control Group Design. This design involved two groups: an experimental group that received instruction using Assemblr Edu- based 3D learning media and a control group that received conventional instruction. Both groups were administered a pretest and a posttest to determine changes in students' learning interest before and after the treatment.

Table 1. Nonequivalent Control Group Design Scheme

Group	Pre-Test	Treatment	Post-test
Experimental	O ₁	X	O ₂
Control	O ₃		O ₄

Research Location and Timeline

The research was conducted at Gajah Mada Senior High School, Bandar Lampung, located at Jalan Soekarno Hatta No. 1, Tanjung Senang District, Bandar Lampung City, Lampung Province. The research was conducted in 2025-2026 and included preparation, data collection, analysis, and report preparation.

Population and Sample

The population in this study was class X students at Gajah Mada Senior High School, Bandar Lampung. The sample was selected using purposive sampling. Purposive sampling is a method of intentionally selecting samples based on specific considerations that align with the research objectives (Subhaktiyasa, 2024).

Based on the observation findings, class X.5 was designated as the experimental class due to its low participation rate, making it suitable for treatment using Assemblr Edu-based 3D learning media. Class X.4 was selected as the control class because its learning process used methods commonly used in schools and could serve as a comparison without Assemblr Edu-based 3D media. The total sample size of the study consisted of 70 students, with class X.4 (35 students) as the control class and X.5 (35 students) as the experimental class.

Instruments

Data were collected using two research instruments: a learning interest questionnaire and a student response observation sheet. The learning interest questionnaire was used as the primary instrument to measure students' learning interest in Geography before and after the implementation of the Assemblr Edu-based 3D learning media. The questionnaire was adapted from Yuniar and Hendrayana (2021) and consisted of 20 statements covering four indicators: enjoyment in learning, learning interest, learning involvement, and learning attention. Responses were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

In addition, a student response observation sheet was administered to students in the experimental class after the learning intervention. This instrument consisted of 20 items distributed across four indicators: media feature variation, ease of understanding the material, visual display clarity, and ease of media use. The observation sheet was designed to evaluate students' perceptions of the use of Assemblr Edu-based 3D learning media during Geography learning activities.

Instrument reliability was tested using Cronbach's Alpha coefficient with IBM SPSS version 27. The observation sheet obtained a Cronbach's Alpha value of 0.918, while the learning interest questionnaire obtained a Cronbach's Alpha value of 0.896, indicating that both instruments had excellent internal consistency and were suitable for data collection.

Table 2. Summary of Research Instruments and Reliability Coefficients

Instruments	Items	Scale	Cronbach's α
Learning Interest Questionnaire	20	Likert (1-5)	0,896
Student Response Observation Sheet	20	Likert (1-5)	0,918

Note. α = Cronbach's alpha reliability coefficient

Data Analysis

The prerequisite analysis tests used in this study include: (1) normality test to determine whether the data obtained is normally distributed or not, using the Shapiro-Wilk test; (2) homogeneity test to determine whether the research data has homogeneous variance or not.

Furthermore, after the prerequisite tests are fulfilled, a hypothesis test is carried out using (3) Independent sample t-test to determine whether there is a statistically significant difference in the average between the two research groups.

RESEARCH AND RESULT

Research Implementation Process

1. Control Class

The control class was not given any treatment using 3D learning media based on Assemblr Edu. The learning process in this class was conducted using conventional methods with the support of textbooks and PowerPoint presentations without interactive 3D visualization. The lesson began with direct instruction from the teacher, followed by an explanation of the hydrological cycle concepts through PowerPoint slides. Students acted as recipients of information by taking notes and participating in simple discussions guided by the teacher.

2. Experimental Class

The implementation of this research in the experimental class was conducted using 3D learning media based on Assemblr Edu on the hydrological cycle material. The learning process began with the presentation of concepts through interactive 3D visualizations, enabling students to better understand processes such as evaporation, condensation, and precipitation. Students were then encouraged to explore the media independently or in groups, interact with 3D objects, and participate in discussions. The use of this media created a more engaging and interactive learning atmosphere, which supported students' learning interest.



Figure 1. Assemblr Edu-based 3D learning media on the hydrological cycle.

The 3D learning media used in this study was not developed directly by the researcher but had been previously developed and tested for its validity. Based on research conducted by Apriyani et al. (2025), the Assemblr Edu-based learning media was categorized as highly feasible for use in the learning process. The validation results showed that material experts rated it at 98%, media experts at 88%, language experts at 84.6%, and education practitioners at 95%. These results indicate that in terms of content, visual appearance, language, and usability, the media meets the quality standards and is appropriate to support geography learning.

Student Learning Interest

1. Learning Interest of Control Class Students

Based on the results of the pre-test and post-test conducted on 35 students, the following pre-test and post-test data are presented.

Table 3 shows the statistical data results for the control class. The pre-test results yielded a mean score of 65.57, a median of 66, a minimum score of 47, a maximum score of 85, and a standard deviation of 9.687. Meanwhile, the post-test results yielded a mean score of 68.57, a

median of 67, a minimum score of 57, a maximum score of 88, and a standard deviation of 7.923.

Table 3. Pre-test and Post-test Data Results for the Control Class

No	Statistics	Pre-test	Post-test
1	Mean	65,57	68,57
2	Median	66	67
3	Minimum Score	47	57
4	Maximum Score	85	88
5	Sandard Deviation	9,687	7,923

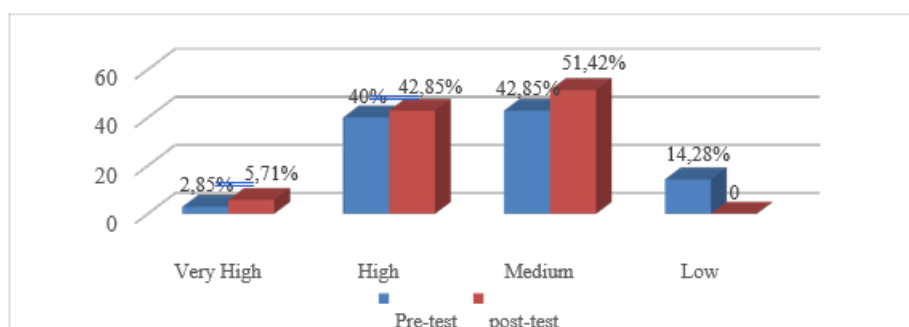


Figure 2. Criteria for the Level of Student Learning Interest in the Control Class

Figure 2 shows the criteria for the level of student learning interest in the control class. There is a change in the distribution of student learning interest categories. The "Very High" category increased from 2.85% to 5.71%, while the "High" category increased from 40% to 42.85%. Meanwhile, the "Medium" category saw an increase from 42.85% to 51.42%, while the "Low" category saw an increase from 14.28% to 0, or no longer appearing.

The following presents the results of the analysis of students' learning interest in the control class based on the indicators.

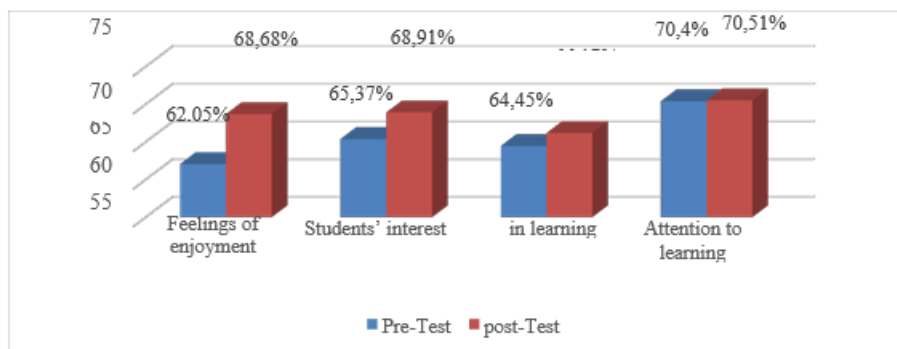


Figure 3. Graph of Learning Interest of Control Class Students

Figure 3 shows that students' learning interest in the control class increased from the pre-test to the post-test for each indicator. The "Feeling of Pleasure" indicator increased from 62.05% to 68.68%, and Student Interest increased from 65.37% to 68.91%. The "Involvement in Learning" indicator also increased from 64.45% to 66.17%, while "Attention to Learning" increased from 70.4% to 70.51%. Overall, the average student interest in learning increased from 65.67% to 68.57%, indicating a change in the category from "Moderate" to "High." The graph in Figure 2 illustrates this increase in each indicator.

2. Learning Interest of Experimental Class Students

Data collection was based on the results of a questionnaire on student learning interests in the experimental class. Based on the results of the pre-test and post-test conducted on 35 students, the data obtained were presented as follows.

Table 4. Pre-test and Post-test Data Results for the Experimental Class

No	Statistics	Pre-test	Post-test
1	Mean	67,31	74,77
2	Median	67	73
3	Minimum Score	41	61
4	Maximum Score	84	97
5	Sandard Deviation	9,728	8,236

Table 4 shows the statistical data results for the experimental class. The pre-test results yielded a mean of 67.31, a median of 67, a minimum score of 41, a maximum score of 84, and a standard deviation of 9.728. Meanwhile, the post-test results yielded a mean of 74.77, a median of 73, a minimum score of 61, a maximum score of 97, and a standard deviation of 8.236.

Furthermore, to determine the level of learning interest of students in the experimental class, the following can be observed

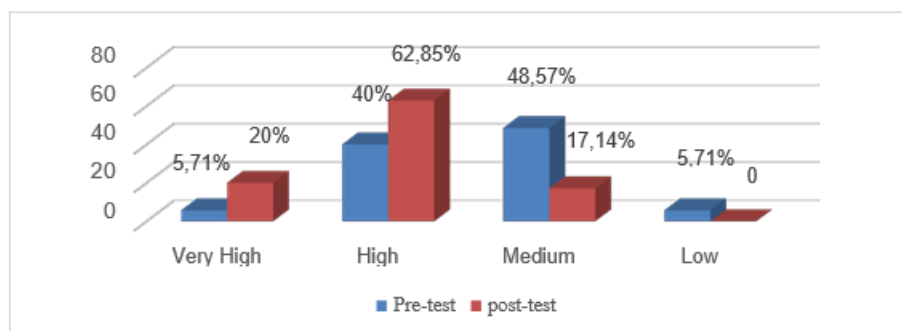


Figure 4. Criteria for the Level of Student Learning Interest in the Experimental Class

Figure 4 shows the results of the pre-test and post-test of learning interest in the experimental class. Changes in student interest categories are evident. The "Very High" category increased from 5.71% to 20%, and the "High" category increased from 40% to 62.85%. Meanwhile, the "Medium" category decreased from 48.57% to 17.14%, and the "Low" category decreased from 5.71% to 0, or no longer appearing. The following presents the results of the analysis of student learning interest in the experimental class based on the indicators

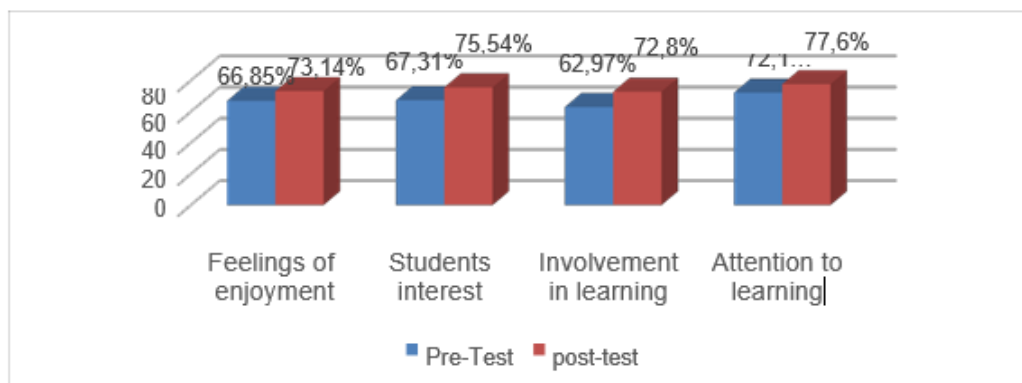


Figure 5. Graph of Learning Interest of Control Class Students

Based on Figure 5, the learning interest of students in the experimental class increased from the pre-test to the post-test for each indicator. The Feeling of Enjoyment indicator increased from 66.85% to 73.14%, and Student Interest increased from 67.31% to 75.54%. The Learning Engagement indicator also increased from 62.97% to 72.8%, while Learning Attention increased from 72.11% to 77.6%. Overall, the average student learning interest increased from 67.31% to 74.77%, indicating a change in the category from "Moderate" to "High." The graph in Figure 5 clarifies this increase in each indicator.

3. Comparison of Differences in Learning Interest of Students in the Control and Experimental Classes

A comparison of student learning interest between the experimental and control classes was conducted by examining the average pre-test and post-test scores for both classes. The results of this comparison are presented below.

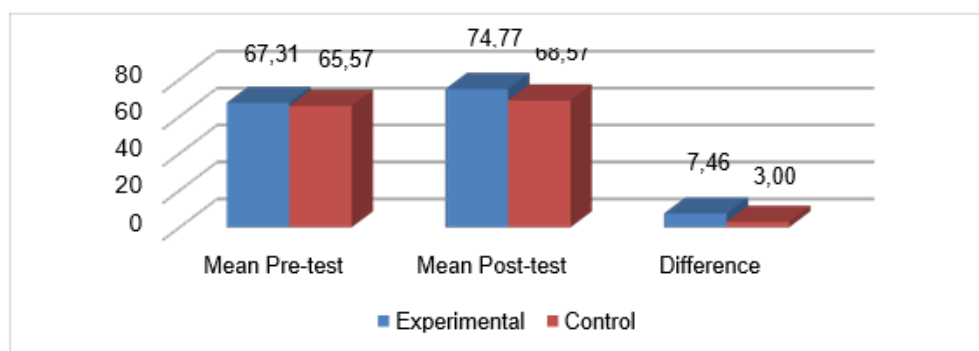


Figure 6. Comparison Chart of Differences in Learning Interest of Students in the Experimental and Control Classes

Figure 6 shows that the average student interest in learning in the experimental class was 67.31 during the pre-test, increasing to 74.77 during the post-test. Meanwhile, in the control class, the average pre-test was 65.57 and increasing to 68.57 during the post-test. Consequently, the difference in student interest in learning in the experimental class (7.46) was higher than in the control class (3.00). Furthermore, the average post-test in the experimental class (74.77) was also higher than in the control class (68.57) by a difference of 6.20.

Student Responses to the Use of Assemblr Edu-Based 3D Media

This student response sheet was given to class X.5 as an experimental class consisting of 35 students. This response sheet was given after students completed learning using 3D media based on Assemblr Edu. The data from the results of student responses to the use of 3D media based on Assemblr Edu can be seen below.

Table 5. Student Responses to the Use of Assemblr Edu-Based 3D Media

No	Indicator	Number of Items	Score obtained	Maximum Score	Percentage	Criteria
1	Media feature variations	4	561	700	80,14%	Good
2	Ease of understanding the material	5	660	875	75,42%	Good
3	Clarity of media display	5	679	875	77,6%	Good
4	Ease of using the media	6	800	1050	76,19%	Good
Total Number			2.700	3.500	77,14%	Good

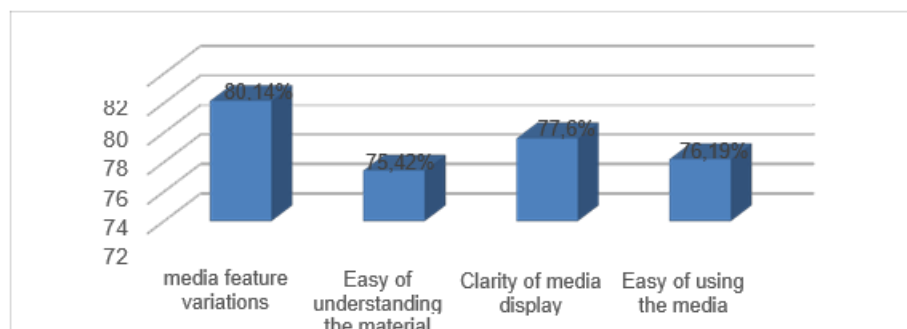


Figure 7. Student Response Graph to the Use of Assemblr Edu-based 3D Media

It was found that all indicators received a Good rating. Media feature variations achieved a percentage of 80.14%, ease of understanding the material achieved a percentage of 75.42%, clarity of the media display achieved a percentage of 77.6%, and ease of use achieved a percentage of 76.19%. These percentages indicate that students responded positively to the use of Assemblr Edu-based 3D learning media.

Prerequisite Test Analysis

The normality test was conducted using IBM SPSS Statistics version 27 with the Shapiro–Wilk method, as the sample size was less than 50. Data were considered normally distributed if the significance value (Sig.) was greater than 0.05. The results showed that all data in the control class (pre-test = 0.701; post-test = 0.099) and the experimental class (pre-test = 0.541; post-test = 0.160) were normally distributed. The homogeneity test was conducted using the Homogeneity of Variances test. The result showed a significance value of 0.979 (> 0.05), indicating that the variances were homogeneous.

Table 6 Results of the Normality Test Using SPSS Statistics version 27

Kolmogorov-Smirnov ^a				Shapiro-Wilk		
Class	Statistic	df	Sig.	Statistic	df	Sig.
Learning Control Class Pre-test	.093	35	.200 [*]	.978	35	.701
Interest Control Class Post-test	.114	35	.200 [*]	.948	35	.099
Experimental Class Pre-test	.100	35	.200 [*]	.973	35	.541
Experimental Class Post-test	.166	35	.016	.955	35	.160

Hypothesis Test Data Analysis

The hypothesis testing in this study used an Independent Samples t-Test because the analyzed data came from two different, unpaired groups: the control class and the experimental class. The test was conducted using SPSS V.27, with the following decision-making criteria: the alternative hypothesis (H_a) is accepted if the significance value (Sig.) is < 0.05 , while the null hypothesis (H_o) is accepted if the significance value (Sig.) is > 0.05 .

The significance value (Sig.) (2-tailed) is 0.002. Because the significance value is less than 0.05 ($0.002 < 0.05$), the alternative hypothesis (H_a) is accepted and the null hypothesis (H_o) is rejected. This indicates a significant difference between student learning interest in the experimental and control classes. Thus, the use of Assemblr Edu-based 3D learning media has a significant effect on student learning interest.

DISCUSSION

The Impact of Assemblr Edu-Based 3D Learning Media on Student Learning Interest

Based on the results of the prerequisite tests and hypothesis testing, it was found that the use of 3D learning media based on Assemblr Edu has a significant effect on students' learning interest, as indicated by the significance value (Sig. 2-tailed) $0,002 < 0.05$. This finding suggests that the use of innovative learning media can improve the quality of the learning process, in line with Pagarra et al. (2022), who state that instructional media serve as a bridge in delivering information and help clarify learning content.

The increase in learning interest was more prominent in the experimental class compared to the control class. This indicates that visual and interactive media provide a more engaging learning experience and enhance student participation. The use of 3D visualization helps transform abstract concepts into more concrete forms, supporting the findings of Nurfadhillah et al. (2021), who argue that learning media can improve students' motivation and interest while making the material easier to understand.

In contrast, the control class, which applied conventional teaching methods, tended to be teacher-centered, resulting in lower student involvement. This supports Magdalena et al. (2020), who explain that limited student participation in the learning process can lead to lower learning interest.

In terms of learning interest indicators, improvements in the experimental class were observed in students' enjoyment, interest, attention, and engagement. Students showed higher enthusiasm during the learning process, which aligns with the indicators of learning interest proposed by Yuniar and Hendrayana (2021). Furthermore, students' interest in the material increased due to the 3D visualization, which stimulated curiosity (Swarni et al., 2024). Students' attention and engagement were also higher, as the media successfully captured their focus and encouraged active participation.

Theoretically, the use of innovative learning media can enhance students' learning interest by attracting attention and creating a more interactive learning environment (Ayunda and Fitriani, 2024). Three-dimensional media also offer advantages in presenting objects more realistically and from multiple perspectives, thereby facilitating better conceptual understanding (Rohmatulloh et al., 2022).

In addition, the use of Assemblr Edu provides a more innovative learning experience through 3D and Augmented Reality visualization, making learning more engaging and easier to understand (Chairudin et al., 2023). Therefore, 3D learning media based on Assemblr Edu can be considered an effective tool for enhancing students' learning interest.

Student Responses to the Use of 3D Learning Media Based on Assemblr Edu

The results of students' responses to the use of 3D learning media based on Assemblr Edu indicate that all indicators fall within the "good" category, with an overall percentage of 77.14%. The highest score was found in the media feature variation indicator (80.14%), indicating that the diverse and interactive features provided by Assemblr Edu played a significant role in enhancing students' learning interest. Features such as interactive 3D objects, materials that can be viewed from different angles, and various learning menus created a more engaging and less monotonous learning experience. This finding supports Rohmatulloh et al. (2022), who state that three-dimensional learning media can actively involve students in the learning process and facilitate better understanding of the material.

In addition, the indicators of ease of understanding (75.42%) and clarity of media display (77.6%) also fall into the good category. These results suggest that 3D visualization helps students understand abstract material more concretely and clearly. This is in line with Akbar et al. (2024)

and Purba and Sarmina (2021), who emphasize that three-dimensional media play an important role in improving conceptual understanding and making learning more meaningful.

However, the media usage indicator (76.19%) revealed several technical constraints during implementation. Some students experienced delays when loading content, particularly due to unstable internet connections and limited device specifications. This finding is consistent with Lino Padang et al. (2021), who highlight that Assemblr Edu may require longer loading times and may encounter technical limitations.

Despite these challenges, the overall student response remains positive, indicating that the advantages of the media outweigh its limitations. Therefore, 3D learning media based on Assemblr Edu can be considered an effective and feasible tool to enhance students' engagement and improve the quality of the learning experience.

SIMPULAN

3D learning media based on Assemblr Edu has a significant effect on students' learning interest in Geography at SMA Gajah Mada Bandar Lampung. This is evidenced by the hypothesis testing results, which show a significance value (Sig. 2-tailed) of < 0.05 , indicating that the alternative hypothesis (H_a) is accepted. In addition, the students' learning interest in the experimental class was higher than in the control class. The use of Assemblr Edu-based 3D media was able to make learning more engaging and interactive, thereby increasing students' involvement in the learning process.

Based on the results of the student response analysis, an average percentage of 77.14% was obtained, which falls into the "good" category. This indicates that students gave positive responses toward the use of 3D learning media based on Assemblr Edu in Geography learning. The media was considered attractive, helpful in understanding the material, and capable of making learning more interactive. Although there were some technical constraints such as internet connectivity issues, in general, this media is considered effective and feasible to be used as an innovation in learning

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