Implementation Of Digital Media Agumented Reality Based On Integrated Neuroscience Of The Qur'an To Improve Students' Physical Insight And Spiritual Attitudes In The Era Of Society 5.0

by Lailatul Nuraini

Implementation Of Digital Media Agumented Reality Based On Integrated Neuroscience Of The Qur'an To Improve Students' Physical Insight And Spiritual Attitudes In The Era Of Society 5.0

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Abstract.*Technological developments in 21st century have had a significant impact on various fields, including education. This study examines the effectiveness of the use of Augmented Reality (AR)-based learning media integrated with neuroscience and Qur'anic values in improving students' understanding of physics and spiritual attitudes in the Society 5.0 era. The research was conducted in two Islamic-based schools, namely SMA Darussalam Blokagung and MA Al-Amiriyyah Blokagung using quantitative methods with pre-test and post-test. The results showed that AR learning media significantly improved students' understanding of physics concepts and spiritual attitudes, as evidenced by the difference in pre-test and post-test scores as well as the results of the N-Gain test which showed the effective category, with an average N-Gain score of 77.12% at SMA Darussalam Blokagung and 76.05% at MA Al-Amiriyyah Blokagung. In addition, students' spiritual attitudes also increased with the average questionnaire score showing the category of "Very Good". This study concludes that the integration of AR technology in learning is effective in improving academic understanding and the development of students' spiritual character.*

Keywords *Augmented Reality, Neuroscience, Physical Insight, Spiritual Attitudes.*

1. INTRODUCTION

The development of technology in the 21st century has had a major impact on various fields, one of which is in the field of education. One of the uses of technology is in the development of digital-based learning media. The integration of digital technology in learning media makes learning media even more interesting. In addition, digital-based learning media can easily illustrate abstract phenomena so that students can easily understand the lesson.

AECT (Association of Education and Communication Technology) defines media as everything used to convey a message, while NEA (National) defines media as objects that can be seen, heard, read, or talked about, as well as using instruments in these activities. From some of these definitions, it can be concluded that learning media is a hardware or software that is used as a means of distributing information from teachers to students. Media, systems, and learning processes are a unit, meaning that learning media is a very important element and is a determinant in learning activities (Daniyati et al., 2023). Because of its very important position in the learning process, the selection of media must be appropriate so that learning goals can be achieved easily. Teachers should also be aware that the learning process is less effective and efficient without learning media (Wulandari et al., 2023).

AR (Augmented Reality) is a technology developed by Thomas P. Caudell in 1990. This technology can help visualize the structure of an abstract concept so that it can understand the description of an object easily. The working principle of Augmented Reality combines the real world and the virtual world by displaying 3D objects (Alfitriani et al., 2021). The use of Augmented Reality is fairly easy because it can work on a smartphone platform, so anyone can easily use it, users only need to scan a camera that has been prepared to trigger the appearance of objects (Andis Indrawan et al., 2021). As a learning medium, Augmented Reality can make it easier for teachers to virtually reconstruct objects into Augmented Reality (Ramadhan et al., 2023).

Various human activities are regulated by the central nervous system located in the brain. Huda and Suyadi (2020) said that neuroscience is a field that studies the brain's nervous system (neurons) by studying the structure, function, evolution, consciousness, and sensitivity of the brain through memory, biology, and education. With the brain, humans have a spiritual tool called the intellect, which can distinguish between right and wrong things. With intellect, they can also think deeply to accept or create new knowledge to solve problems. Nowadays, education does not pay attention to the aspect of neuroscience, this is very important to maximize brain function. In addition, neuroscience can be applied in learning to create brain-based learning curricula and theories (Permata et al., 2024).

According to (Baihaki et al., 2023), Augmented Reality-based learning media can increase students' understanding of concepts, learning interests, and learning outcomes. The results of research from (Putra Socrates & Mufit, 2022) explain that the use of Augmented Reality can improve students' problem-solving skills. Although Augmented Reality has many positive impacts on learning, the use of Augmented Reality as a learning medium is still not common in some schools. Therefore, researchers want to find out how effective Augmented Reality learning media is to improve students' physical insight and spiritual attitudes.

2. METHODS

This research model uses a quantitative method with the pretest postest. The sample was taken from 2 classes from 2 different schools. Each sample received the same treatment, the sample will work on the pretest questions first and then be given learning media in the form of Augmented Reality. Then, after using Augmented Reality media in learning activities, it will be continued by working on the latest questions. The results of doing the posttest will later be analyzed.

Data analysis was carried out by assessing the cognitive learning outcomes of students in class XI MIPA 6 SMA Darussalam Blokagung and class XI MIA 2 MA Al-Amiriyyah Blokagung. The experimental class was selected based on the advice of the physics teacher, and the pre-test was given to students before the application of Augmented Reality learning media while the post-test was given after the application of Augmented Reality learning media.

After conducting a normality test on the data that has been obtained so that the data results are normally distributed, the N-Gain test is then carried out. The N-Gain test is used to measure the effectiveness of a learning or intervention in improving student learning outcomes (Volunteer et al, 2024). The N-Gain score ranged from -1 to 1, with a positive value indicating an improvement in learning outcomes after learning and a negative value indicating a decrease in learning outcomes. The following equation is used to measure the N-Gain score:

$$N gain = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ Max - Skor\ Pretest} \quad \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Information:

N-Gain : normality gain test value

Posttest Score : Posttest Score

Pretest Score : Pretest Score

Max Score : Maximum score

The following criteria for determining the level of effectiveness, can be seen in Table 1.

Table 2.1. Criteria for Determining the Level of Effectiveness

Presented(%)	Interpretation
< 40	Ineffective
40 − 55	Less Effective
56 − 75	Quite Effective
76	Effective

Source: (Sukarelawan et al, 2024).

The assessment of spiritual attitudes was carried out by providing questionnaires to the respondents, namely class XI MIPA 6 SMA Darussalam Blokagung and class XI MIA 2 MA Al-Amiriyyah Blokagung. The questionnaire consists of several indicators including faith and devotion, gratitude, and morals. The following is the distribution of students' spiritual attitude values, which can be seen in Table 2.

Table 2.2. Distribution of students' spiritual attitude values

Value Range	Criterion	Predicate
81 − 100	Very good	A
61 − 80	Good	B
41 − 60	Pretty Good	C
21 − 40	Not Good	D
1 − 20	Bad	E

3. RESULTS

The application of Augmented Reality digital learning media based on integrated neuroscience of the Qur'an was carried out in 2 different schools located at the Darussalam Blokagung Islamic Boarding School, Banyuwangi. The activity began with an observation of Islamic-based schools which was held on Tuesday, July 6, 2024. The purpose of observation is to understand the specific needs of students and teachers related to learning media and assess the readiness of schools in adopting new learning media. By making these observations, researchers can ensure that the media developed or implemented is in accordance with the needs and context of the school, so as to increase the effectiveness of learning. Based on the results of these observations, SMA Darussalam Blokagung and MA Al-Amiriyyah Blokagung are schools where the application of Augmented Reality digital learning media based on integrated neuroscience is al-Qur'an. Documentation of school observation activities as shown in Figure 1 below.

Figure 3.1 Documentation of school observation activities

Based on the advice of the physics teacher at the school, the application of learning media was carried out in class XI MIPA 6 for SMA Darussalam Blokagung and class XI MIA 2 for MA Al-Amiriyyah Blokagung. The implementation of the media will be carried out for 2 days, namely on July 15-16, 2024. The implementation of the activity was on the first day at SMA Darussalam Blokagung and the second day at MA Al-Amiriyyah Blokagung. The series of activities for the application of Augmented Reality digital learning media based on integrated neuroscience of the Qur'an includes: perception, implementation of pre-test, presentation of material and use of AR media, strengthening of material, then implementation of post-test and filling out spiritual attitude questionnaires. Documentation of media application activities as shown in Figure 2 and Figure 3 below.

Figure 3.2. The application of media in MA Al-Amiriyyah Blokagung

Pre-test activities are carried out to measure the initial knowledge in students, assess the extent of students' understanding and skills before starting a program or lesson. Meanwhile, the post-test aims to evaluate the success and measure the effectiveness of the learning media used. The data on the results of the pre-test conducted at SMA Darussalam Blokagung obtained the lowest score of 15 and the highest score of 60, for the post-test score obtained the lowest score of 60 and the highest score of 90. The pre-test score carried out at MA Al-Amiriyyah Blokagung obtained a tendah score of 10 and the highest score of 50, for the post-test score obtained the lowest score of 55 and the highest score of 100. Then, from the data that has been obtained, a normal test will be carried out using SPSS. The following is the data on the results of the normality test from the pre-test and post-test of students, which can be seen in Figure 4 and Figure 5.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest	.197	29	.005	.956	29	.262
postest	.187	29	.011	.932	29	.061

a. Lilliefors Significance Correction

Figure 3.3 Normality test from the *pre-test* and *post-test* of SMA Darussalam Blokagung

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Postest	.137	25	.200[*]	.942	25	.162
pretest	.201	25	.010	.929	25	.080

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 3.4 Normality test from the pre-test and post-test of MA Al-Amiriyyah Blokagung

Based on the data in the table above, it can be seen that the Sig value (2-tailed) in the sample exceeds 0.05 so it can be concluded that the students' pre-test and post-test scores have a normal distribution. After the data is distributed normally, the N-Gain score and N-Gain percent tests will be carried out using SPSS. The following is the average data of the N-Gain score and N-Gain percent test results, which can be seen in Table 3.

Table 3.3. Average N-Gain test results score and N-Gain percent

School	Average NGain Skor	Average NGain Persent
SMA Darussalam Blokagung	77	77,12
MA Al-Amiriyyah Blokagung	76	76,05

The analysis of the data from the N-Gain score and N-Gain percent test results above shows that the average N-gain score of students at SMA Darussalam blokagung is 77 and the average N-Gain percentage is 77.12% with the effective category. Meanwhile, the average N-gain score of students at MA Al-Amiriyyah blokagung is 76 and the average N-Gain percentage is 76.05% with the effective category.

The spiritual attitude of students is measured by giving a spiritual attitude questionnaire to students. The questionnaire consists of several indicators, including: faith and devotion, gratitude, and morals. Based on the data from the questionnaire filled out by 55 respondents, 25 of them are students of MA Al-Amiriyyah blokagung and 30 people are students of SMA Darussalam blokagung. The following is the average result of the questionnaire score that has been filled out by 55 respondents, can be seen in Table 4.

Table 3.4. Average spiritual attitude questionnaire score

School	Average Score	Category
SMA Darussalam Blokagung	87,03	Very good
MA Al-Amiriyyah Blokagung	87,66	Very good

From the data obtained from the questionnaire scores that have been filled out by 55 respondents, the highest and lowest scores of the respondents of SMA Darussalam Blokagung are 98 and 76 with an overall average of 87.03. Meanwhile, the highest and lowest scores of respondents of MA Al-Amiriyyah Blokagung were 100 and 82 with an average of 87.66. This shows that the spiritual attitude of students at SMA Darussalam Blokagung and MA Al-Amiriyyah Blokagung is in the category of Very Good.

Based on the results of the data analysis that has been carried out, it can be concluded that neuroscience-based Augmented Reality learning media is effective in improving students' spiritual insights and attitudes. This is evidenced by the difference in the scores of the pretest

and posttest results, in addition to the score of the NGain test results from each school shows the effective category, namely 77.12% for SMA Darussalam Blokagung and 76.05% for MA Al-Amiriyyah Blokagung. Thus, this learning media has an influence on students, namely it can increase students' spiritual insight and attitude in the era of society 5.0.

4. CONCLUSION

The application of neuroscience-based Augmented Reality digital learning media integrated with the Qur'an has proven to be effective in improving students' physical insight and spiritual attitudes in two Islamic-based schools that are the subject of the research. The average N-Gain test score shows the effective category with a score of 77.12% for SMA Darussalam Blokagung and 76.05% for MA Al-Amiriyyah Blokagung. In addition, students' spiritual attitudes also improved, with the average questionnaire score showing the category of "Very Good". This research indicates that the integration of AR technology in learning can have a positive impact on academic understanding and the development of students' spiritual character in the Society 5.0 era

5. REFERENCES

Alfitriani, N., Maula, W. A., & Hadiapurwa, A. (2021). Penggunaan media augmented reality dalam pembelajaran mengenal bentuk rupa bumi. Jurnal Pendidikan dan Pengajaran (JPP), 38(1).

Andis Indrawan, I. W., Saputra, K. O., & Linawati, L. (2021). Augmented reality sebagai media pendidikan interaktif dalam pandemi Covid-19. Majalah Ilmiah Teknologi Elektro, 20(1), 61. https://doi.org/10.24843/mite.2021.v20i01.p07

Baihaki, M. R., Rasyadi, M. J., Hafiz, M., Juliyanto, F., & Rahma, F. (2023). Teknologi AR sebagai media pembelajaran: Tinjauan literatur. Prosiding Sains Nasional dan Teknologi, 13(1), 185. https://doi.org/10.36499/psnst.v13i1.9139

Daniyati, A., Saputri, I. B., Wijaya, R., Septiyani, S. A., & Setiawan, U. (2023). Konsep dasar media pembelajaran. Journal of Student Research (JSR), 1(1), 282–294.

Huda, A. M. (2020). Otak dan akal dalam kajian Al-Quran dan neurosains. Jurnal Pendidikan Islam Indonesia, 5(1), 67-79.

Permata, I., Asbari, M., & Aprilia, M. (2024). Pengaruh kecerdasan intelektual dan kecerdasan emosional dalam perspektif neurosains di dunia pendidikan. Journal of Information Systems and Management (JISMA), 3(2), 60-64.

Putra Socrates, T., & Mufit, F. (2022). Efektivitas penerapan media pembelajaran fisika berbasis augmented reality: Studi literatur.

Ramadhan, I. R., Djoko Lesmono, A., Kusuma, F., & Anggraeni, A. (2023). Penerapan augmented reality sebagai media pembelajaran pada pokok bahasan gerak lurus. *Jurnal Pendidikan Fisika, 4*(1). Retrieved from http://jurnal.fkip.unmul.ac.id/index.php/JLPF

Sukarelawa, M. I., Indratno, T. K., & Si, M. P. (2024). *N-Gain vs Stacking*. Yogyakarta: Penerbit Suryacahya.

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya media pembelajaran dalam proses belajar mengajar. *Journal on Education, 5*(2), 3928–3936.

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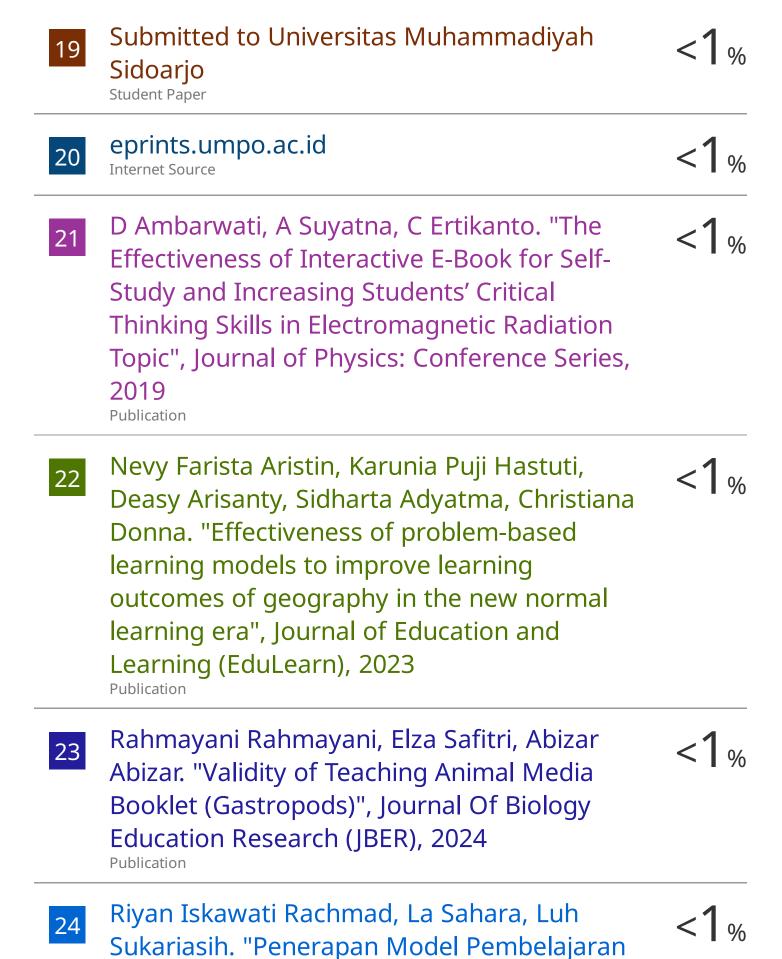| 1	Submitted to International College of Management Student Paper	1%
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