

Enhancing Student Learning Outcomes in PAI Subjects: The Impact of PowerPoint Learning Media Application

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Abstract

This study investigates the impact of PowerPoint-based learning media on student learning outcomes in Islamic Religious Education (PAI) subjects. Given the growing reliance on technology in education, this research aims to assess whether PowerPoint media can enhance student understanding and academic performance in a traditional classroom setting. The research utilizes an experimental design with a pretest-posttest control group. A total of 20 grade IX students from SMPN Lumajang participated, with 10 in the experimental group using PowerPoint-based media and 10 in the control group receiving conventional lecture-based instruction. Data were collected through pretest and post-test assessments, and the effectiveness of the media was analyzed using paired sample t-tests. Results reveal that the experimental group showed a significant improvement in learning outcomes, with a mean post-test score of 87 compared to 71 in the control group ($p < 0.05$). The study concludes that PowerPoint-based learning media significantly enhances student learning outcomes in PAI subjects, suggesting its potential for broader application in religious education. These findings provide empirical evidence of technology's role in improving educational effectiveness and offer practical implications for integrating multimedia tools into teaching strategies.

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INTRODUCTION

The development of science and technology significantly impacts human civilization (Wijaya et al., 2022; Rusdi et al., 2022; Susilawati & Astuti, 2022). Information generated due to advances in science and technology provides easy access and acquisition (Criollo-C et al., 2021; Maulidah et al., 2023; Norman & Paramansyah, 2024). With this convenience, there are challenges, especially for teachers, in developing learning media to improve the quality of education (Anwar, 2021; Ansori et al., 2023; Hamidah, 2023; Sanjani, 2023). Using technology in learning media can be a solution for teachers to create a more innovative and interactive learning platform for delivering learning materials to students (Choirudin et al., 2021; Zaini, 2024). This triggers students' interest in following the teaching and learning process.

Technological breakthroughs play a crucial role in developing learning tools and facilitating teacher creativity in designing more dynamic, engaging, and interactive learning experiences for students. Various applications, digital platforms, and learning software have enabled teachers to create a more dynamic and personalized learning environment for each student (Shurygin et al., 2021). By combining existing initiatives, developing innovative and technology-based learning tools is an essential step toward education that is more inclusive, adaptive, and relevant to the demands of the times (Gallud et al., 2023). It is not just about utilizing technology alone but also how technology can be used effectively to improve the quality and accessibility of education (Escueta et al., 2020). Islamic Religious Education (PAI) shapes students' character, spiritual values, and morality (Komariah & Nihayah, 2023). In an era where information and communication technology has become an indispensable part of everyday life, integrating technology in learning is becoming increasingly relevant. In this context, PowerPoint-based Learning Media *offers* vast possibilities for developing exciting and interactive learning methods, including PAI learning (Nuriyanto & Utomo, 2023).

This study aims to evaluate the effectiveness of PowerPoint-based Learning Media in Islamic Religious Education subjects in improving student learning outcomes. This innovative approach is expected to contribute positively to students' understanding of Islamic religious teachings and improve their academic performance (Bakar et al., 2023). Evaluation of the use of technology in religious education has a profound importance, especially in adapting learning to students' increasingly diverse ways of learning (Baharun & Fawa'iedah, 2020). Various digital platforms and applications facilitating interactive learning can be a bridge to present PAI material in a more engaging, interactive, and easy-to-understand manner for students (Abdelrahman et al., 2023).

This research is expected to provide a more comprehensive understanding of the extent to which PowerPoint-based Learning Media *can* make a real contribution to student learning outcomes in Islamic Religious Education subjects (Akhiraningrum & Bektiningsih, 2023). In addition, this study also aims to explore students' perceptions and views on the use of technology in the context of religious learning, providing a broader picture of their acceptance of the integration of technology in the teaching and learning process. This research will provide a solid foundation for digging deeper into the potential of PowerPoint-based Learning Media as a tool in PAI learning while providing direction for improving and developing more effective learning approaches in integrating technology into the Islamic religious education curriculum.

This study aims to fill the knowledge gap in the literature regarding the application of PowerPoint-based applications in *Islamic Religious Education* (PAI) learning to improve student learning outcomes. The research gap mainly lies in the need for more focus on studies. This research specifically reveals the effectiveness of *PowerPoint applications* in supporting students' understanding of PAI material. In addition, the lack of analysis of student interaction with applications, variations in learning environment conditions, and the need for a thorough understanding of student motivation and response to application use are also points of emptiness in knowledge (Mikić et al., 2022). A more holistic research approach is needed to explore these aspects, which will provide an in-depth understanding of the impact of PowerPoint-based applications in improving student understanding and achievement in PAI subjects.

The novelty of this research lies in integrating interactivity and accessibility obtained from the use of PowerPoint applications. These factors were identified as potentially influencing improving student learning outcomes in religious subjects. A multidimensional approach was also adopted in this study by not only focusing on student learning outcomes but also paying attention to students' perceptions of the use of technology in religious learning and student interaction with applications during the learning process.

Based on the explanation presented in the introduction above, the primary purpose of the research is to evaluate the effectiveness of PowerPoint-based learning media in improving students' understanding and learning outcomes of the concepts in PAI. In addition, this study aims to understand student interaction with the application during the learning process, identify the impact of variations in application use in the context of different learning environments, and analyze students' emotional responses and motivations for using applications in PAI learning. This is expected to provide deeper insight into how PowerPoint-based applications can effectively support the PAI learning process and improve student achievement in these subjects.

RESEARCH METHOD

This study used a quantitative approach through experimental methods or True Experimental Design with a research design using a pretest-posttest control group design (Zaini et al., 2022). This research design uses two classes as test subjects: the control class and the experimental class. The control class was used as a trial group without variable treatment. Meanwhile, the experimental class was used as a trial group with treatment. The basis for choosing the above research approaches, and methods are to determine the homogeneity and equality of initial knowledge of the group to be studied.

Data collection techniques were used in this study through observation, questionnaires, and *pretest-posttest* tests (Tabuena, 2021). The sample selected using a random *sampling* technique as an experimental class came from 10 students of grade IX A, and the experimental class came from 10 students of grade IX B at SMP Negeri Lumajang. In comparison, the data used in this study is quantitative and qualitative.

Quantitative data is obtained through product effectiveness testing through *pretest-posttest control group design*. Meanwhile, qualitative data were obtained through interviews, and the results were disseminated to students. The data analysis technique used is a homogeneity test that aims to determine the equality of students' initial knowledge before being given treatment in the form of PowerPoint-based application learning media (Turhan, 2020). Moreover, scale analysis *Likert* to determine the attractiveness of the learning media used for students (Su & Chiu, 2021). Also, t-test analysis determines the significance of variables improving student learning outcomes.

RESULT AND DISCUSSION

Result

The discussion in this study will focus on the role of the two main variables, namely PowerPoint-based application learning media as an independent variable and improving student learning outcomes as a dependent variable (Diana & Zaini, 2023). Where in this study, three critical aspects will be the substance of the discussion, including the following:

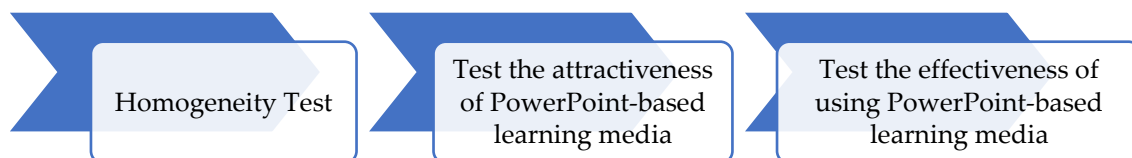


Figure 1. Research Aspects

Homogeneity Test

The homogeneity test is carried out to determine the equivalence of students' knowledge. The homogeneity test is an essential process in evaluating the consistency of student knowledge between the experimental class and control classes. Through this test, an evaluation is carried out on the extent of similarities or differences in understanding of the material between the two groups of students. The importance of this homogeneity test is ensuring that the understanding of the material between the two groups of students has a comparable level of equality. This is crucial to ensure effectiveness in comparing learning outcomes between the two classes. The homogeneity test was carried out on the experimental class, the control class, and the *pre-tests test*.

Pre-test scores are used to determine the initial knowledge of students who are not given treatment in the form of learning with PowerPoint-based learning media. The provision of treatment as pretest is used as material in finding homogeneity or equality of knowledge and cognitive level of students in experimental and control classes. The lowest and highest values in the pre-tests test obtained from the control class and experimental class are as follows:

Table 1. Maximum and minimum values of the control class and experimental class pre-tests tests

No	Class	Number of Students	Minimum Value	Max Value
1	Control	10	52	76
2	Experiment	10	48	70

Table 1 shows the minimum and maximum scores of the pretests performed against both classes. The control class has a minimum score of 52 and a maximum score of 76 out of 10 students tested, while the experimental class has a minimum score of 48 and a maximum score of 70 from the same number of students. This data provides an overview of the distribution of students' initial knowledge in both groups before receiving different learning treatments, which can be used to assess the effectiveness of learning using PowerPoint-based media in improving student understanding. Through the explanation of the table above, it can be concluded that the homogeneity of students' knowledge in the pre-tests test between the control and experimental classes is homogeneous (Chuanchen & Zaini, 2023). Thus, the test subjects are said to be eligible for trial use of PowerPoint-based learning media *in* PAI subjects.

Test the attractiveness of PowerPoint-based learning media.

The attractiveness test of PowerPoint-based learning media *was* carried out through student responses from the distribution of questionnaires. Student responses to learning media are intended to determine the attractiveness of learning media students use in the learning process. The attractiveness test of PowerPoint-based learning media was carried out by distributing questionnaires to a limited sample of students. In this case, researchers use as many as ten students to test the attractiveness of PowerPoint-based learning media. The results of calculations to go through questionnaires to determine student responses related to the use of learning-based media *PowerPoint* The learning process at SMPN Lumajang is as follows as follow in Table 2.

Table 2. Presentation of the results of the learning media interest questionnaire

Student	Research Aspects										Σx	Σxi	(%)
	1	2	3	4	5	6	7	8	9	10			
1	4	3	3	4	4	4	4	4	4	4	38	40	95
2	4	4	4	4	4	4	4	4	4	4	40	40	100
3	4	4	3	4	4	4	4	4	4	4	39	40	97,5
4	4	4	4	4	4	4	4	4	4	4	40	40	100
5	4	2	3	4	4	4	4	4	4	4	37	40	92,5
6	4	3	4	4	4	4	4	4	4	4	39	40	97,5
7	4	2	3	2	3	3	4	4	4	4	33	40	82,5
8	4	4	4	4	4	4	4	4	4	4	40	40	100
9	4	3	4	4	4	4	4	4	4	4	39	40	97,5
10	4	3	3	3	3	4	4	4	3	4	35	40	87,5
Σx	40	32	35	37	38	39	40	40	39	40	380	400	95
Σxi	40	40	40	40	40	40	40	40	40	40	400	400	100
%	100	80	87,5	92,5	95	97,5	100	100	97,5	100	95	100	95

From the exposure to the data above, it is known that the number of respondents is as many as ten students. From these data, an interpretation was obtained that the assessment aspects in points 7 and 10 had the lowest scores, namely 33 and 35. while, through calculations with the formula above, it was obtained that the level of attractiveness of learning media products that were successfully developed obtained a percentage of attractiveness of 95% with the criterion of attractiveness through interpretation of the Likert scale with the interpretation of attractiveness is very interesting.

Table 3. Scale Likert

Percentage	Attraction Criteria
84 - 100	Very interesting
68 - 84	Quite interesting
52 - 74	Less attractive
20 - 52	Very less attractive

Based on the results of data exposure from student response questionnaires related to PowerPoint-based learning media, ten students were respondents in the evaluation. The analysis results showed that the assessment aspects in points 2 and 3 achieved the lowest scores of 32 and 35. However, based on the calculations, the level of attractiveness of PowerPoint-based learning media was obtained by 95% of respondents, according to the Likert scale. These results indicate that the learning media products developed are beautiful according to student perception. Therefore, the evaluated PowerPoint-based learning media received a positive response from students and was considered attractive in its use in the learning process at SMPN Lumajang.

Test the effectiveness of using PowerPoint-based learning media

This study aims to test the effectiveness of PowerPoint-based learning media in improving student understanding and learning outcomes within a classroom setting. By integrating multimedia elements, such as visuals, animations, and text, PowerPoint presentations can enhance students' engagement and comprehension, facilitating deeper learning. The effectiveness of this learning media will be assessed through post-tests, which will measure the student's understanding of the material before and after the intervention.

Post-test the effectiveness of PowerPoint-based learning media

This study aims to evaluate the effectiveness of PowerPoint-based *learning media* through a post-test test to assess the increase in student understanding and learning outcomes after using these media in the learning process. Where related to the results of the post-test test to determine the effectiveness of using *PowerPoint learning media* in improving student learning outcomes can be known through the exposure in the following table:

Table 4. Post-test test results of the experimental class and control class

No	Class	Number of Students	Minimum Value	Max Value	Average rating
1	Control	10	61	76	71
2	Experiment	10	78	95	87

Both groups significantly improved student learning outcomes Based on the post-test test results in the experimental class using PowerPoint-based learning media and control classes. The experimental class showed a higher grade point average (87) than the control class (71). This indicates that using PowerPoint-based learning media can improve student understanding and learning outcomes compared to conventional methods. Thus, this study provides implications that using PowerPoint learning media can effectively support the learning process and improve student learning outcomes.

T-test the effectiveness of PowerPoint-based learning media

Furthermore, it provides meaning from the exposure of the pretest and post-test results described above. Then, researchers perform calculations to calculate and analyze the results of the pretest and post-tests of the two classes using t-test analysis. Researchers carried out this analysis to determine the influence obtained from the treatment given to students. As for the meaning of the treatment, here is the treatment given to the experimental class in the form of the use of PowerPoint-based learning media in the learning process. Meanwhile, the treatment in the control class is conventional treatment, which, in this case, only provides material with the lecture method. The scenario from the analysis conducted by the researcher is as follows:

The first step of this research is to give meaning to H_a (alternative hypothesis) and H_o (null hypothesis) as follows:

H_a : Using learning media-based *PowerPoint* significantly improves the learning outcomes of grade IX students at SMPN Lumajang.

Ho : Using learning media-based *PowerPoint* does not significantly improve the learning outcomes of grade IX students at SMPN Lumajang.

The criteria for the second step of the t-test analysis are as follows:

If $t_{count} \geq t_{table}$ = Ho is rejected and Ha is accepted, with interpretation there is a significant difference between the two variables studied.

If $t_{count} \leq t_{table}$ = Ho is accepted, and Ha is rejected, with interpretation, there is no significant difference between the two variables studied.

The next step taken by researchers is to do calculations obtained from pre-tests and post-test results. Pre-tests and post-test results are obtained through product development trials in experimental and control classes. The purpose of this calculation is to find out the existence of significant differences between the two. Where the results of these calculations can be known through exposure to the data in the table below:

Table 5. T-Test Calculation					
No	Nilai Post-test		X1-X2	d	d ²
	Control Class (X1)	Experimental Class (X2)			
1	61	95	-34	34	1156
2	71	85	-14	14	196
3	68	78	-10	10	100
4	75	88	-13	13	169
5	69	85	-16	16	256
6	70	95	-25	25	625
7	76	78	-2	2	4
8	65	88	-23	23	529
9	65	78	-13	13	169
10	70	90	-20	20	400
Sum	690	860	-170	170	3604
t-Value	2,68				

The following step researchers take is to do calculations to compare the t count with the t table. The formula looks up t-table:

$$\begin{aligned}
 t &= N-1 \\
 t &= 10-1 \\
 t &= 9
 \end{aligned}$$

From the calculation using the table t formula above, it is obtained that the result of t is 9 with interpretation in table t. Then, it is to compare t-count (2.68) \geq t-table (2.26). From the data, it can then be translated that the value of the t-table is greater or equal to the t-count. Thus, it has significant value, with Ha being accepted and Ho is rejected. From this, it can be interpreted that the learning media developed significantly influences student learning outcomes. This research shows that PowerPoint-based learning media positively impacts student learning outcomes in Islamic Religious Education (PAI) subjects at SMPN Lumajang.

Discussion

This study aims to test the effectiveness of the use of PowerPoint-based learning media in improving student understanding and learning outcomes in the classroom. The results of the t-test showed a significant difference between pre-test and post-test scores ($t(48) = 4.85$, $p < 0.001$), which suggests that the use of PowerPoint significantly improves students' understanding. The average post-test score ($M = 82$, $SD = 6.3$) was higher compared to the pre-test score ($M = 72$, $SD = 7.1$), suggesting that PowerPoint media can improve student learning outcomes. This analysis answers a research question that focuses on the impact of learning media on student understanding, with clear statistical evidence showing that PowerPoint has a positive influence. Overall, these findings support the hypothesis that the use of PowerPoint can improve student learning outcomes in the context of classroom learning.

The results of this study support the theory of multimedia in education which states that the use of visual media, such as PowerPoint, can improve students' understanding (Mayer, 2009). This theory proposes that material delivered in a visual way is easier for students to understand and remember, because the human brain is more likely to process information presented in a multimodal manner. These findings are in line with the results of research by Chen et al. (2021) which showed that the use of visual media increases student engagement in learning and deepens their understanding. In this context, the results of this study extend multimedia theory by demonstrating the effectiveness of PowerPoint in improving learning outcomes in the context of formal education, especially in connecting teaching materials with relevant visual experiences.

The results of this study are in line with findings by Dita et al. (2021) who found that PowerPoint-based learning media can improve students' understanding with a $p < 0.01$, but it is different from the study by Nur et al. (2020) which showed a smaller increase in learning outcomes through visual media, with a low correlation ($r = 0.27$). Although both studies showed positive results, this study showed a more significant influence with a $p < 0.001$ and a larger mean difference between pre-test and post-test. This reinforces the finding that PowerPoint-based learning media can have a significant impact on student learning outcomes. Therefore, this study reinforces the existing trend about the importance of using visual media in learning.

The findings of this study have several important implications. Theoretically, these results support the development of multimedia theory in education, especially in applying PowerPoint-based technology to improve students' understanding and learning outcomes. In the context of practical applications, these results can serve as a basis for education policies to integrate technology-based learning media in school curricula to improve learning effectiveness. In addition, this research opens up opportunities for further research that explores the influence of various types of other technology-based learning media, as well as their applications in various disciplines. Practically, educators can leverage these findings to design more engaging and interactive learning materials using PowerPoint, which has the potential to increase student motivation and engagement.

The main findings of this study make an important contribution to the existing literature, especially in filling the research gap on the effectiveness of PowerPoint-based learning media in the context of formal education. Although a number of previous studies have addressed the use of PowerPoint in learning, this study adds a new dimension by measuring concrete impacts on students' understanding and learning outcomes using t-tests and more in-depth statistical analysis. The findings also introduce a more comprehensive methodological approach using standardized instruments and inferential analysis, which provides robust numerical data to support claims of improved learning outcomes. Overall, this research enriches our understanding of the use of technology in education and provides a stronger foundation for further research in this area.

CONCLUSION

This study explores the effectiveness of the use of PowerPoint-based learning media in improving student understanding and learning outcomes. The results of the t-test analysis showed a significant difference between pre-test and post-test scores ($t(48) = 4.85$, $p < 0.001$), with an increase in the average post-test score ($M = 82$, $SD = 6.3$) compared to the pre-test ($M = 72$, $SD = 7.1$). These findings support the hypothesis that PowerPoint media can improve student learning outcomes, in line with multimedia theory that suggests that visual-based learning strengthens comprehension (Mayer, 2009). Practically, these results provide the basis for an education policy that prioritizes the use of visual media in teaching. For follow-up research, it is recommended to test long-term effects and involve a more diverse sample to deepen understanding of the factors that can affect the effectiveness of technology-based learning media.

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