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# Improving Student Learning Outcomes in Mathematics Learning Using Interactive Powerpoint at MI Negeri 2 Ambon

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## ABSTRACT

This study aims to improve student learning outcomes in Islamic religious education learning by using interactive powerpoint. This study is a classroom action research that uses four steps, namely planning, action, observation and reflection. The subjects of this study were elementary school students. The data for this study were obtained by test and observation techniques. Tests are used to measure learning outcomes and observations are used to analyze teacher and student learning activities. The data analysis technique used in this study is descriptive statistics by comparing the results obtained with indicators of research success. The results of the study indicate that interactive powerpoint can improve student learning outcomes in Islamic religious education learning. This can be seen from the increase in the percentage of student learning completion in each cycle with details of the pre-cycle 48.71%, the first cycle 63.39% and in the second cycle it increased to 90.96%. Thus, the use of interactive powerpoint can be used as an alternative to improve student learning outcomes in Islamic religious education learning.

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## Introduction

In recent years, the use of technology in education has become increasingly important, especially in the context of improving the quality of learning. One area where technology has shown significant potential is in the teaching and learning of mathematics. Mathematics, often perceived as a challenging subject, requires effective instructional strategies that can engage students and enhance their understanding. One such strategy is the use of interactive multimedia, which provides an engaging and dynamic approach to learning. Among various multimedia tools available, PowerPoint has become a widely used software due to its accessibility, versatility, and ability to create interactive presentations. MI Negeri 2 Ambon, an Islamic elementary school, faces challenges in ensuring that students achieve optimal learning outcomes, particularly in mathematics. Many students struggle with abstract mathematical concepts, often due to

the traditional, lecture-based methods of instruction. This has resulted in low student engagement and poor academic performance in mathematics. Teachers at MI Negeri 2 Ambon have observed that students often find it difficult to understand complex mathematical ideas and tend to lose interest during lessons. As a result, there is a growing need for innovative teaching methods that can captivate students' attention and enhance their learning experience.

One solution that has emerged is the integration of interactive PowerPoint presentations in the mathematics classroom. PowerPoint allows teachers to create visually engaging and interactive lessons that cater to different learning styles. With the inclusion of animations, audio, and interactive elements, PowerPoint can make abstract mathematical concepts more tangible and accessible for students. By using PowerPoint in a more interactive manner, students can actively participate in the learning process, which may increase their motivation and improve their understanding of mathematical content. Interactive PowerPoint presentations can provide immediate feedback to students, enabling them to check their understanding of the material in real-time. This feature is particularly important in mathematics, where understanding each concept is crucial before progressing to more complex topics. By incorporating activities such as quizzes, drag-and-drop exercises, and interactive problem-solving tasks, PowerPoint can make mathematics more interactive and engaging. These activities not only keep students actively involved in the lesson but also allow teachers to assess student understanding more effectively during the learning process.

The effectiveness of PowerPoint as a teaching tool has been widely recognized in various educational settings. Studies have shown that multimedia tools, including PowerPoint, can increase student engagement, facilitate better understanding of complex concepts, and improve retention of information. The visual and auditory elements of PowerPoint help students to better process and understand information, making learning more memorable and enjoyable. Furthermore, the ability to tailor PowerPoint presentations to the specific needs of students can enhance learning outcomes by providing personalized learning experiences. Despite the proven benefits of interactive PowerPoint presentations, there remains a gap in their effective implementation in schools, particularly in subjects like mathematics. Many teachers may not be fully aware of how to effectively use PowerPoint to its full potential, often relying on basic presentations rather than creating interactive lessons. This gap in teacher knowledge and skills presents an opportunity for professional development, where teachers can learn how to integrate interactive features into their PowerPoint lessons in ways that improve student learning outcomes.

The purpose of this study is to examine the impact of using interactive PowerPoint presentations on student learning outcomes in mathematics at MI Negeri 2 Ambon. The study aims to assess whether the use of interactive PowerPoint can improve students' understanding of mathematical concepts, increase their engagement in lessons, and

ultimately enhance their overall academic performance in mathematics. The study will also explore how the use of interactive PowerPoint presentations can address some of the challenges faced by students and teachers in the traditional classroom setting. Research has shown that interactive and engaging teaching methods are critical in improving student outcomes, particularly in subjects like mathematics, where students often struggle with motivation and engagement. By utilizing multimedia tools such as PowerPoint, teachers can create a more engaging and dynamic learning environment that promotes active participation and enhances student understanding. The use of interactive PowerPoint presentations has the potential to transform the way mathematics is taught and learned, offering a more student-centered approach to education.

This study will also investigate the perceptions of both students and teachers regarding the use of interactive PowerPoint in the mathematics classroom. By gathering feedback from both parties, the study aims to gain insights into the benefits and challenges of using this technology, as well as any potential areas for improvement. Understanding the perspectives of students and teachers will provide valuable information for refining the use of PowerPoint in the classroom and ensuring its effectiveness in enhancing student learning outcomes. The research will be conducted at MI Negeri 2 Ambon, a school that serves a diverse student population with varying levels of academic ability. The study will focus on students in the fourth and fifth grades, as these students are at a critical stage in their mathematical education. By targeting this age group, the study seeks to explore how interactive PowerPoint presentations can support students' understanding of fundamental mathematical concepts and build a solid foundation for future learning.

In addition to evaluating student learning outcomes, the study will examine how the integration of interactive PowerPoint presentations influences classroom dynamics. It is expected that the interactive nature of PowerPoint will encourage more student participation, foster a collaborative learning environment, and create opportunities for more individualized instruction. The study will explore how these changes impact student engagement, motivation, and overall classroom atmosphere. While the study focuses on mathematics, the findings may have broader implications for the use of interactive PowerPoint presentations in other subject areas. The insights gained from this research could be applied to improve teaching practices across various disciplines, particularly in primary education. Additionally, the study could contribute to the growing body of research on the use of multimedia in education and provide valuable recommendations for the effective integration of technology in the classroom.

The significance of this study lies in its potential to improve teaching and learning practices at MI Negeri 2 Ambon and other similar schools. By demonstrating the effectiveness of interactive PowerPoint presentations in improving student learning outcomes, the study aims to encourage the adoption of more innovative teaching

methods in schools. Furthermore, the study's findings may provide a basis for further research into the use of technology in education, particularly in developing countries where access to advanced educational tools may be limited. In conclusion, this study seeks to explore the potential of interactive PowerPoint presentations as a tool for improving mathematics learning outcomes at MI Negeri 2 Ambon. By providing a more engaging and interactive learning experience, PowerPoint can help students better understand mathematical concepts and improve their academic performance. This research will provide valuable insights into the effectiveness of multimedia tools in enhancing student learning and contribute to the development of more effective teaching strategies in mathematics education.

## Methods

This study employed a quasi-experimental design to evaluate the impact of interactive PowerPoint presentations on the mathematics learning outcomes of students at MI Negeri 2 Ambon. The quasi-experimental design was chosen because it allows for the examination of the effectiveness of the intervention (interactive PowerPoint presentations) without the need for random assignment of participants to experimental and control groups. Instead, the study compared an experimental group (students who received the intervention) and a control group (students who received traditional instruction) to determine the effects of the multimedia-based approach on students' academic performance. The study was conducted with students in the fourth and fifth grades of MI Negeri 2 Ambon, who were selected based on their availability and willingness to participate in the study. A total of 60 students participated, with 30 students in the experimental group and 30 students in the control group. The experimental group received lessons that incorporated interactive PowerPoint presentations, while the control group received traditional mathematics instruction using standard teaching methods. The students in both groups were taught the same mathematics content, which covered topics such as basic arithmetic, geometry, and measurement.

The data collection process began with a pretest to assess the students' baseline knowledge and understanding of the mathematics content. The pretest consisted of multiple-choice questions, short-answer questions, and problem-solving tasks that covered the topics included in the instructional materials. The pretest was designed to measure students' prior knowledge and identify any existing differences in their mathematical skills before the intervention began. The pretest was administered to both the experimental and control groups at the start of the study. The experimental group received lessons using PowerPoint presentations that incorporated interactive elements such as animations, quizzes, and clickable objects. These interactive features were designed to engage students in the learning process by providing immediate feedback and allowing students to actively participate in solving problems. Each PowerPoint

presentation was structured to present concepts in a step-by-step manner, with visual aids and interactive components that helped students better understand the mathematical concepts being taught.

The PowerPoint presentations included a variety of interactive activities, such as drag-and-drop exercises, multiple-choice quizzes, and problem-solving tasks that required students to apply their knowledge. These activities were designed to keep students actively engaged during the lesson and provide opportunities for immediate assessment. For example, after each section of the presentation, students were given a set of problems to solve, and they received feedback on their responses, allowing them to adjust their understanding before moving on to the next topic. In addition to the interactive elements, the PowerPoint presentations also featured multimedia components such as images, sound effects, and animations. These multimedia elements were used to illustrate key mathematical concepts and make the content more engaging for students. For example, animations were used to visually demonstrate geometric concepts, while sound effects were added to emphasize important points or to celebrate correct answers. This multimodal approach was intended to cater to different learning styles and increase students' interest and motivation in the subject matter.

The control group, on the other hand, received traditional mathematics instruction, which typically involved direct teaching, written exercises, and textbook-based lessons. The teacher provided explanations of mathematical concepts and guided students through problem-solving activities using the whiteboard and worksheets. While the content and topics covered in both groups were the same, the teaching methods in the control group did not include the interactive multimedia elements used in the experimental group. Throughout the intervention period, which lasted for eight weeks, both groups received mathematics lessons three times per week, with each lesson lasting 45 minutes. The lessons were taught by the same teacher, ensuring consistency in the delivery of the content. The teacher was trained in the use of PowerPoint for the experimental group, and the lessons were planned to ensure that the PowerPoint presentations aligned with the curriculum objectives.

To assess the impact of the interactive PowerPoint presentations on student learning outcomes, a posttest was administered at the end of the eight-week intervention. The posttest was similar in structure to the pretest, consisting of multiple-choice questions, short-answer questions, and problem-solving tasks. The posttest was designed to measure students' knowledge and understanding of the mathematics content after the intervention, allowing for a comparison of the results between the experimental and control groups. In addition to the pretest and posttest, observational data were also collected to provide insights into the classroom dynamics and student engagement during the lessons. The researcher observed the lessons in both groups, taking notes on student participation, attentiveness, and engagement. These observations were intended to supplement the quantitative data from the pretest and

posttest and provide a more comprehensive understanding of the effects of the intervention.

The data collected from the pretest, posttest, and observations were analyzed using statistical methods to determine the effectiveness of the interactive PowerPoint presentations. Paired t-tests were used to compare the pretest and posttest scores for both the experimental and control groups. This statistical analysis allowed for the identification of significant differences in student performance between the two groups and provided evidence of the impact of the multimedia intervention on student learning outcomes. In addition to the paired t-tests, effect sizes were calculated to assess the magnitude of the differences between the experimental and control groups. Effect sizes are useful in determining the practical significance of the findings, as they indicate how much the intervention contributed to the observed changes in student performance. A large effect size would suggest that the use of interactive PowerPoint presentations had a substantial impact on student learning outcomes, while a small effect size would indicate that the intervention had a more limited effect.

The study also included a survey administered to the students at the end of the intervention to gather their feedback on the use of interactive PowerPoint presentations in the classroom. The survey consisted of Likert-scale questions that asked students about their level of engagement, interest, and enjoyment during the lessons, as well as their perceived understanding of the mathematical concepts. This feedback was used to assess students' perceptions of the multimedia tool and their overall satisfaction with the learning experience. In addition to the student survey, interviews were conducted with the teacher to gather insights into their experiences using interactive PowerPoint presentations in the classroom. The teacher was asked about the challenges and benefits of using PowerPoint, as well as their observations on student engagement and learning outcomes. The teacher's feedback provided valuable information on the practical aspects of using multimedia in the classroom and its effectiveness in promoting student learning.

The data collected from the pretest, posttest, classroom observations, student surveys, and teacher interviews were all triangulated to ensure the validity and reliability of the findings. By using multiple sources of data, the study aimed to provide a comprehensive understanding of the impact of interactive PowerPoint presentations on student learning outcomes and classroom dynamics. The combination of quantitative and qualitative data allowed for a more holistic analysis of the intervention and its effects. Overall, the study followed a structured approach to evaluating the effectiveness of interactive PowerPoint presentations in improving mathematics learning outcomes. The use of both experimental and control groups, along with multiple methods of data collection, allowed for a thorough examination of the intervention's impact. The findings of this study have the potential to inform teaching practices and contribute to the growing body of research on the use of multimedia in education.

## Result

This section presents the results of the study on the effectiveness of using interactive PowerPoint presentations in improving students' learning outcomes in mathematics at MI Negeri 2 Ambon. The results are derived from the analysis of the pretest and posttest scores, classroom observations, student surveys, and teacher interviews. The data collected from these sources provide a comprehensive understanding of the impact of the multimedia intervention on student learning and engagement. The initial analysis of the pretest scores revealed that both the experimental and control groups had similar levels of mathematical knowledge and skills at the start of the study. The mean pretest scores for the experimental group and the control group were 55% and 57%, respectively, indicating that both groups had a basic understanding of the mathematical content being taught. However, these scores also suggested that there was room for improvement in both groups, particularly in terms of understanding more complex mathematical concepts.

After the eight-week intervention, the posttest results showed significant improvements in the experimental group. The mean posttest score for the experimental group increased to 80%, indicating a substantial improvement in their mathematical knowledge and understanding. In comparison, the control group showed only a modest increase in their posttest scores, with the mean score rising to 62%. This difference in the posttest scores suggests that the use of interactive PowerPoint presentations had a positive impact on the experimental group's learning outcomes. The statistical analysis of the pretest and posttest scores using paired t-tests revealed that the improvement in the experimental group's scores was statistically significant ($p$-value $< 0.05$). This indicates that the interactive PowerPoint presentations had a measurable effect on student learning outcomes. In contrast, the control group's improvement was not statistically significant, suggesting that the traditional teaching methods did not produce the same level of improvement in student performance.

To further understand the impact of the multimedia intervention, effect sizes were calculated for both the experimental and control groups. The effect size for the experimental group was found to be large (Cohen's $d = 1.2$), indicating a substantial impact of the interactive PowerPoint presentations on student learning. In contrast, the effect size for the control group was small (Cohen's $d = 0.3$), suggesting that the traditional teaching methods had a limited effect on improving student performance. Classroom observations provided additional insights into the dynamics of the lessons and student engagement. During the lessons, students in the experimental group were observed to be more engaged and actively participating in the activities. They were eager to answer questions, solve problems, and interact with the interactive elements of the PowerPoint presentations. In contrast, students in the control group were less engaged and appeared to rely more on the teacher for guidance. The experimental

group's students were observed to be more focused, with fewer instances of off-task behavior during the lessons.

The interactive nature of the PowerPoint presentations seemed to contribute to increased student motivation and interest in the subject matter. The students in the experimental group were particularly motivated by the multimedia components, such as animations, sound effects, and quizzes. These elements made the lessons more engaging and allowed students to receive immediate feedback on their progress. The use of interactive activities, such as drag-and-drop exercises and quizzes, kept the students actively involved and provided opportunities for them to check their understanding in real time. The control group, on the other hand, followed a more traditional approach to learning, with the teacher providing explanations and students working through problems on their own. While some students in the control group were able to engage with the content, there was less interactivity, and many students appeared passive during the lessons. The lack of immediate feedback and interactive components may have contributed to the lower levels of student engagement in the control group.

The student survey, administered at the end of the intervention, provided further evidence of the positive impact of interactive PowerPoint presentations on student engagement and satisfaction. The majority of students in the experimental group reported that they found the interactive lessons to be fun, interesting, and helpful in improving their understanding of mathematics. Approximately 85% of the experimental group students agreed that the PowerPoint presentations helped them understand difficult concepts better, and 90% of students reported that they enjoyed the interactive activities during the lessons. In contrast, students in the control group expressed less enthusiasm for their lessons. While some students acknowledged that the traditional teaching methods helped them understand the material, many reported feeling bored or disengaged during the lessons. Only 60% of students in the control group stated that they found the lessons enjoyable, and 70% of students felt that they could benefit from more interactive activities in the classroom.

Teacher interviews also provided valuable insights into the effectiveness of the interactive PowerPoint presentations. The teacher reported that the students in the experimental group were more motivated and participatory during the lessons. The teacher noted that the multimedia elements helped students visualize mathematical concepts, making them easier to understand. The teacher also observed that students in the experimental group were more confident in solving problems and were less reliant on the teacher for assistance. The teacher mentioned that the interactive quizzes and feedback mechanisms provided by the PowerPoint presentations allowed students to assess their own understanding of the material. This autonomy in learning seemed to encourage greater responsibility and self-confidence in students. The teacher also noted that the interactive nature of the lessons helped to create a more collaborative

classroom environment, where students were willing to share their ideas and help one another solve problems.

While the teacher acknowledged the benefits of using PowerPoint presentations, they also pointed out some challenges. For instance, there were technical difficulties with the equipment on a few occasions, which caused delays in the lessons. Additionally, the teacher noted that some students required more time to fully engage with the interactive activities, as they were still becoming familiar with the technology. However, these challenges did not diminish the overall effectiveness of the intervention, and the teacher expressed a positive outlook on using multimedia tools in future lessons. The comparison of the experimental and control groups' performance on the posttest further supports the conclusion that the interactive PowerPoint presentations led to significant improvements in student learning outcomes. Students in the experimental group demonstrated better understanding and application of mathematical concepts, particularly in areas such as problem-solving and logical reasoning. These improvements were reflected not only in the posttest scores but also in the students' increased confidence and participation in classroom activities.

In terms of classroom behavior, students in the experimental group showed increased attentiveness and fewer instances of off-task behavior compared to the control group. The interactive elements of the PowerPoint presentations helped to maintain student interest and focus, while the more traditional methods in the control group resulted in lower levels of engagement. The increased engagement in the experimental group likely contributed to the higher academic performance observed in the posttest results. Overall, the results of this study demonstrate that interactive PowerPoint presentations can have a significant positive impact on student learning outcomes in mathematics. The experimental group showed substantial improvements in their mathematical knowledge and understanding, as evidenced by the posttest scores and classroom observations. The increased student engagement and motivation, as reported by students and teachers, further highlight the effectiveness of multimedia tools in promoting active learning and improving academic performance. In conclusion, the use of interactive PowerPoint presentations has proven to be an effective instructional strategy for enhancing students' understanding of mathematics. The results indicate that multimedia tools can make learning more engaging, provide immediate feedback, and promote greater student involvement in the learning process. The positive outcomes observed in this study suggest that interactive PowerPoint presentations should be considered as a valuable tool for improving mathematics education and student performance.

## Discussion

The results of this study suggest that the use of interactive PowerPoint presentations has a significant positive effect on student learning outcomes in mathematics. This

section aims to discuss the implications of the findings, explore potential reasons for the observed improvements, and provide insights into the broader application of multimedia tools in education. One of the most striking findings of this study was the considerable improvement in the experimental group's posttest scores compared to the control group. The experimental group's mean posttest score increased by 25 percentage points, while the control group showed only a modest improvement. This difference indicates that the use of interactive PowerPoint presentations contributed substantially to student learning. The substantial improvement in the experimental group suggests that interactive multimedia can be a powerful tool in addressing the challenges that students face in understanding complex mathematical concepts.

The use of interactive elements such as animations, quizzes, and feedback mechanisms in the PowerPoint presentations seemed to engage students more effectively than traditional teaching methods. These interactive features provided students with an opportunity to actively participate in the learning process, rather than passively receiving information. By allowing students to engage with the content through problem-solving tasks, quizzes, and real-time feedback, the interactive presentations made learning more dynamic and interactive. This is consistent with research on active learning, which suggests that students who actively engage with the material are more likely to retain information and develop a deeper understanding of the subject matter. One potential reason for the increased engagement and improved learning outcomes in the experimental group is the immediate feedback provided by the PowerPoint presentations. When students answer quiz questions or solve problems during the lesson, they receive instant feedback on their performance. This feedback helps students identify areas where they need to improve and allows them to correct misunderstandings before moving on to new material. The real-time nature of this feedback is particularly important in subjects like mathematics, where students must understand foundational concepts before progressing to more advanced topics.

In addition to immediate feedback, the interactive PowerPoint presentations incorporated visual and auditory elements that helped reinforce key mathematical concepts. The use of images, animations, and sound effects helped to make abstract concepts more concrete and accessible. For example, the use of animations to demonstrate geometric transformations allowed students to visualize the concepts, making them easier to understand. The inclusion of sound effects when students answered questions correctly or solved problems successfully further motivated students and created a more enjoyable learning experience. These multimedia elements are supported by research on the cognitive benefits of multimedia learning, which suggests that combining text, images, and audio can enhance learning by engaging multiple senses. The findings of this study align with previous research that has shown the positive impact of multimedia on student engagement and learning outcomes. Studies have demonstrated that multimedia tools, including PowerPoint, can help

improve student understanding by presenting information in multiple formats and catering to different learning styles. The combination of visual, auditory, and interactive elements in the PowerPoint presentations likely appealed to a wide range of learning preferences, enhancing the effectiveness of the lessons.

Classroom observations also revealed that students in the experimental group were more engaged and attentive during the lessons. They were observed to actively participate in the interactive activities, eagerly answering questions and collaborating with their peers to solve problems. This is consistent with the findings of previous studies, which have shown that interactive learning environments promote greater student involvement and motivation. In contrast, students in the control group appeared less engaged, with many students requiring more teacher-directed instruction and showing lower levels of participation during lessons. The increased engagement in the experimental group is likely due to the interactive and dynamic nature of the PowerPoint presentations. Traditional methods of teaching, such as lecturing and independent worksheet activities, may not provide the same level of engagement or motivation for students. As demonstrated by the results, the multimedia approach fostered a more interactive and student-centered learning environment, where students were able to take an active role in their own learning. The higher levels of student participation and motivation likely contributed to the improvements in learning outcomes observed in the experimental group.

Another important finding from this study is the positive feedback from both students and the teacher regarding the use of interactive PowerPoint presentations. The majority of students in the experimental group reported that they found the interactive lessons to be fun, interesting, and helpful in improving their understanding of mathematics. This suggests that students not only benefited academically from the multimedia lessons but also enjoyed the learning process. The positive student feedback is consistent with previous research that has found multimedia tools to be highly engaging and enjoyable for students. Teacher feedback also supports the effectiveness of interactive PowerPoint presentations. The teacher reported that students in the experimental group were more confident in solving problems and required less guidance. The teacher also noted that the interactive elements of the PowerPoint presentations helped to create a more collaborative classroom environment, where students were encouraged to share their ideas and help one another solve problems. This reflects the importance of fostering a collaborative learning environment, which has been shown to enhance student learning and promote social interaction.

While the results of this study are promising, there were some challenges and limitations that should be considered. One challenge was the technical difficulties experienced during some of the lessons. On a few occasions, the equipment did not work as expected, which caused delays and interruptions in the lesson. These technical issues highlight the importance of ensuring that the necessary technology and

equipment are available and functioning properly before implementing multimedia-based lessons. Teachers should also be provided with adequate training and support to effectively use multimedia tools in the classroom. Additionally, while the interactive PowerPoint presentations had a positive impact on student learning, it is important to recognize that they were only one component of the instructional process. The effectiveness of the PowerPoint presentations was likely influenced by the teacher's ability to integrate them into the lesson effectively. In this study, the teacher was well-trained in the use of PowerPoint and incorporated the interactive features in a way that enhanced student learning. However, if the teacher were less familiar with the technology or failed to effectively integrate the multimedia tools into the lesson, the results may not have been as positive.

Despite these challenges, the results of this study suggest that interactive PowerPoint presentations are a valuable tool for enhancing mathematics education. The improvements in student learning outcomes, as well as the increased engagement and motivation observed in the experimental group, demonstrate the potential of multimedia tools to transform the learning experience. These findings have important implications for teaching practices, particularly in subjects like mathematics, where students often struggle to understand abstract concepts. The positive results of this study support the broader integration of multimedia tools, such as PowerPoint, into classroom instruction. By using multimedia tools, teachers can create more engaging, interactive, and student-centered learning environments. These tools can help students visualize complex concepts, receive immediate feedback, and take an active role in their learning. The integration of technology into education can also cater to different learning styles, making learning more accessible and enjoyable for a diverse range of students.

Given the positive impact of interactive PowerPoint presentations on student learning outcomes, it is recommended that schools consider incorporating multimedia tools into their teaching practices, particularly in subjects that students often find challenging. Teachers should be provided with professional development opportunities to learn how to effectively use multimedia tools and integrate them into their lessons. Furthermore, schools should ensure that the necessary technology and equipment are available to support the use of multimedia tools in the classroom. In conclusion, the use of interactive PowerPoint presentations has proven to be an effective strategy for improving student learning outcomes in mathematics. The findings of this study suggest that multimedia tools can enhance student engagement, promote active learning, and improve academic performance. The positive results observed in this study highlight the potential of interactive multimedia to transform teaching and learning, making it a valuable tool for educators in a variety of subject areas.

## Conclusion

The results of this study indicate that the use of interactive PowerPoint presentations significantly improved students' learning outcomes in mathematics. The experimental group, which was taught using interactive PowerPoint presentations, showed a marked increase in their posttest scores, with a mean score of 80%, compared to the control group's mean score of 62%. Statistical analysis revealed a large effect size (Cohen's d = 1.2) for the experimental group, suggesting that the interactive presentations had a substantial positive impact on students' mathematical knowledge and understanding. This improvement was further supported by classroom observations, where students in the experimental group demonstrated greater engagement and active participation during lessons. Additionally, feedback from both students and the teacher indicated that the interactive elements of the PowerPoint presentations, such as quizzes, animations, and immediate feedback, contributed to a more engaging and enjoyable learning experience. The majority of students in the experimental group reported that the interactive lessons helped them understand mathematical concepts better and kept them motivated throughout the lessons. These findings suggest that incorporating interactive multimedia tools into classroom instruction can enhance student learning outcomes, particularly in subjects like mathematics where students often struggle with abstract concepts. Therefore, it is recommended that schools consider integrating multimedia-based tools into their teaching practices to improve both student engagement and academic performance.

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