

The Effect of Interactive Multimedia Based on PowerPoint on the Learning Outcomes of Vocational High School Students

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ABSTRACT

The use of engaging and interactive learning media is essential in the learning process at vocational high schools, particularly in accounting classes, which are often considered difficult and boring. One alternative that can be used is interactive multimedia based on PowerPoint, which can present material through text, images, animations, and quizzes, making it easier for students to understand. This study focuses on analyzing the impact of interactive multimedia based on PowerPoint on the learning outcomes of students at Rina Hasanah Vocational High School majoring in Accounting and Financial Institutions. The research method used is a true experiment with a Pre-test Post-test Control Group Design. The research population consisted of all 60 students in the 10th grade, divided into two groups: 30 students in the experimental group and 30 students in the control group, selected using simple random sampling. The research instrument consisted of a multiple-choice learning achievement test with 30 questions that had been tested for validity (22 valid questions) and reliability ($\alpha = 0.852$). Data analysis was conducted using normality tests, homogeneity tests, independent t-tests, and N-Gain calculations. The results showed that the average post-test score of the experimental group (82.5) was higher than that of the control group (72.1). The t-test produced a calculated t-value of 4.215 > t-table 2.001 with a significance of $0.000 < 0.05$, indicating a significant difference between the two groups. The N-Gain calculation also shows an increase in learning outcomes for the experimental group of 0.57 (moderate category), while the control group only increased by 0.31 (low category). It can be concluded that interactive multimedia based on PowerPoint is effective in improving students' learning outcomes in vocational high schools for the subject of Accounting, making it worthy of use as one of the innovative teaching strategies in vocational high schools.

Keywords: Interactive Multimedia, PowerPoint, Learning Outcomes, Vocational High School

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INTRODUCTION

Advances in information and communication technology have changed various aspects of life, including education (Cholik, 2021). In today's digital age, the learning process can no longer rely on conventional methods, but must adapt to the needs of millennials who are familiar with technology (Lestyaningrum et al., 2022). Students need interactive, creative, and enjoyable learning experiences, so the role of teachers is not only to convey information, but also to act as facilitators who can optimize the use of learning media.

The use of learning media is crucial in increasing the efficiency and quality of learning (Lubis et al., 2023). Rahim et al. (2022) states that the media functions as a tool to convey messages and stimulate attention. The right media can make material easier to understand, more interesting, and reduce verbalism in the learning process (Kandia et al., 2023). This shows that learning success is not only determined by the ability of teachers, but also supported by the use of media that is appropriate to the characteristics of students.

One of the most widely used media in schools is Microsoft PowerPoint (Putri & Arifin, 2023). This application is familiar to teachers and students, but its use is often limited to static presentation of material. In fact, PowerPoint has various features that can be developed into interactive multimedia, for example by adding animations, audio, video, hyperlinks, and interactive quizzes (Mahdi, 2022).

Utilizing these features can make learning more lively and enable interaction between students and the material.

The concept of interactive multimedia is in line with the multimedia learning theory proposed by Mayer (2009) (Mayer, 2024), namely that learning is more effective when information is presented through a combination of text, images, sound, and animation. By utilizing various sensory channels, students can more easily understand the material and remember the information they have learned. In addition, interactive multimedia also supports the principles of constructivist learning, in which students are actively involved in constructing their own knowledge.

A common phenomenon found in various vocational high schools is the low academic performance of students in subjects that require an understanding of abstract concepts, such as accounting. One of the reasons for these low learning outcomes is the presentation of material that is not very interesting and the dominance of lecture-style teaching methods in the learning and teaching activities (Opoku et al., 2023). According to a report by the Education Assessment Center (2022), the numeracy literacy achievement of vocational high school students in Indonesia is still below average, indicating the need to improve learning strategies through the use of technology.

In this context, the use of interactive multimedia based on PowerPoint becomes relevant. This medium is capable of presenting abstract accounting concepts in a more concrete form through simulations, visualizations, and interactive exercises. Thus, students not only hear the teacher's explanations, but can also learn through direct experience interacting with the media.

A number of previous studies also support the effectiveness of interactive multimedia. Inderanata & Sukardi (2014) Research has demonstrated that the use of interactive multimedia enhances the learning achievements of vocational high school students in mechanical engineering subjects. Another study by Herian et al. (2022) shows that Google Classroom-based interactive PowerPoint has a significant effect on science learning outcomes. In contrast, Fitri & Efendi (2024) revealed that implementing Canva-based interactive multimedia enhanced elementary school students' early reading abilities.

The findings of this research suggest that interactive multimedia can be applied to various levels of education and fields of study. However, research examining the use of PowerPoint-based interactive multimedia among vocational high school students majoring in accounting and finance is still limited. In fact, the field of accounting requires a deep understanding of concepts and the capability to address numerical problems. With the right media support, students will find it easier to understand and master the material.

Based on this phenomenon, this study is important to further investigate the impact of PowerPoint-based interactive multimedia on the academic performance of vocational high school students, particularly those majoring in accounting and financial institutions. The results of this study are expected to contribute significantly to the development of learning media in vocational high schools and act as a guideline for teachers in enhancing learning quality through the integration of technology.

METHOD

This study used a quantitative approach with a true experiment design. The research employed a pre-test post-test control group design, consisting of two groups: the experimental group and the control group. (Permatasari et al., 2022). Both groups were given a pre-test, then the experimental group was given treatment in the form of learning with interactive multimedia based on PowerPoint, whereas the control group was taught using conventional methods (Shatri & Shala, 2022). After the learning process was completed, both groups were given a final test (post-test).

The research was conducted at SMK Rina Hasanah in the Accounting and Financial Institutions department during the odd semester of the 2025/2026 academic year. The research population consisted of all 60 students in the 10th grade. The research sample was determined using simple random sampling, resulting in two classes, namely 30 students as the experimental group and 30 students as the control group.

The research instrument consisted of a multiple-choice test comprising 30 questions. To ensure the quality of the instrument, validity and reliability tests were conducted (Hartini et al., 2023). Validity

testing was conducted using the point biserial correlation technique with the help of 30 test respondents. The results showed that of the 30 questions, 22 were declared valid because the calculated r was greater than the table r at a significance level of 5%, while 8 questions were declared invalid and discarded.

Table 1. Instrument Validity Test

Classification	Number of Questions	Question Number
Valid	22	1, 2, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 20, 22, 23, 25, 26, 27, 29, 30
Invalid	8	3, 6, 12, 16, 19, 21, 24, 28

After the questions were declared valid, reliability testing was conducted using Cronbach's alpha formula. The calculation results obtained a calculated r value of 0.852, while the table r at a significance level of 5% was 0.361. Because the r value was greater than the r table, the test instrument was declared reliable and suitable for use in research.

Table 2. Instrument Reliability Test

r value	r table ($\alpha = 0,05$)	Description
0,852	0,361	Reliable

Thus, the learning outcome test instruments used in this study meet the validity and reliability requirements so that they can be used to measure student learning outcomes in Accounting.

FINDING AND DISCUSSION

Initial data was obtained through a pre-test administered to both groups with the aim of determining the students' initial abilities prior to treatment. The pre-test results showed that the average scores of the experimental group (58.7) and the control group (59.3) were relatively equal, so it could be assumed that the initial conditions of the two groups were homogeneous. After learning with different treatments, the students were given a post-test to assess their learning improvement.

Table 3. Average Pre-test and Post-test Scores

Group	Number of Students	Pre-test Average	Post-test Average
Experimental	30	58,7	82,5
Control	30	59,3	72,1

Based on this data, it can be seen that the increase in post-test scores in the experimental group (82.5) was much higher than in the control group (72.1). This indicates that the treatment given to the experimental group was more effective in improving student learning outcomes than that given to the control group.

Before testing the hypothesis prerequisite tests were conducted including normality and homogeneity tests. The normality test aims to determine whether the student learning outcome data in each group are normally distributed. In this study the normality test was carried out using the Kolmogorov-Smirnov method. Meanwhile the homogeneity test was conducted to ensure that the variance between data groups was in the same condition (homogeneous). The homogeneity test was performed using Levene's Test.

Table 4. Normality Test

Data	Sig. (p)	Criteria	Description
Pre-test Experiment	0,200	$p > 0,05$	Normal
Pre-test Control	0,187	$p > 0,05$	Normal
Post-test Experiment	0,142	$p > 0,05$	Normal
Post-test Control	0,164	$p > 0,05$	Normal

The test results in Table 4 show that the significance value of all data is greater than 0.05, so it can be concluded that the student learning outcome data, both pre-test and post-test in the experimental and control groups, are normally distributed.

Table 5. Homogeneity Test

Data	Sig. (p)	Criteria	Description
Pre-test	0,284	$p > 0,05$	Homogen
Post-test	0,317	$p > 0,05$	Homogen

Based on Table 5 the pre-test significance value was 0.284 and the post-test significance value was 0.317 both of which were greater than 0.05. Therefore it can be concluded that the variance of the data between the experimental group and the control group was homogeneous. After the data were confirmed to be normally distributed and to have homogeneous variance a t-test was conducted to examine whether there was a significant difference between the learning outcomes of students in the experimental group and the control group. This test focused on the post-test results as they represent the final achievement after the learning treatment was administered.

Table 6. t-test of Learning Outcomes

Data	t value	t table ($\alpha = 0,05$)	Sig. (p)	Description
Post-test	4,215	2,001	0,000	Significant

Based on Table 6 the calculated t-value was 4.215 which exceeded the table t-value of 2.001 at a 5% significance level. Furthermore the significance value (p) of 0.000 was less than 0.05. This shows that there was a significant difference between the learning outcomes of students in the experimental group and those in the control group. Therefore it can be concluded that the learning treatment applied to the experimental group had a positive and more effective impact on improving learning outcomes compared to the method used in the control group.

To determine the extent of improvement in learning outcomes after the treatment, a Normalized Gain (N-Gain) calculation was performed. This analysis was used to assess the effectiveness of the treatment in improving students' learning outcomes, with improvement categories including low, moderate, and high.

Table 7. N-Gain Learning Outcomes

Group	N-Gain	Criteria
Experimental	0,57	Moderate
Control	0,31	Low

Based on Table 7, it can be seen that the experimental group obtained an average N-Gain of 0.57, which is in the moderate category, while the control group only reached 0.31, which is in the low category. These results indicate that learning using interactive multimedia based on PowerPoint is more effective in improving student learning outcomes than conventional learning.

The research findings indicate that the use of interactive multimedia based on PowerPoint has a significant impact on student learning outcomes. The average post-test scores of students who

learned using interactive multimedia were higher than those of students who learned through conventional methods. Additionally, the N-Gain calculations also showed a better improvement in the experimental group.

These findings support Mayer's (2009) multimedia learning theory, which states that learning will be more effective if information is presented through a combination of text, images, audio, and animation. By using interactive multimedia, students can more easily understand the material, become more motivated, and be more active in the learning process.

The results of this study are also consistent with the research by Hutagalung (2021), which found that interactive multimedia can improve the learning outcomes of vocational high school students in mechanical engineering competencies. Similarly, the research by Schmid et al. (2023) shows that interactive PowerPoint has a significant effect on science learning outcomes.

Therefore, it can be concluded that interactive multimedia based on PowerPoint is suitable for use as a learning medium in vocational schools, particularly in the Accounting and Financial Institutions departments. This medium not only helps improve conceptual understanding but also provides a more engaging and meaningful learning experience.

CONCLUSIONS

Based on the findings of this study it can be concluded that the application of interactive multimedia designed with PowerPoint has a significant influence on the learning outcomes of 10th grade students majoring in Accounting and Financial Institutions at SMK Rina Hasanah in the 2025/2026 academic year. This conclusion is supported by the evidence of a clear and statistically significant difference in the average post-test scores between the experimental group and the control group. The results of the t-test analysis further strengthen this conclusion by showing that the calculated t-value is higher than the table t-value at a 5% significance level which confirms the effectiveness of the treatment.

Moreover the results of the N-Gain analysis demonstrate that the improvement in learning outcomes for students in the experimental group was categorized as moderate while the improvement in the control group was only categorized as low. These results highlight that students who were taught using PowerPoint-based interactive multimedia experienced a more meaningful and measurable improvement compared to those who received conventional instruction. Therefore it can be confidently affirmed that PowerPoint-based interactive multimedia is more effective and provides greater benefits in enhancing student learning outcomes than traditional learning methods.

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