

The Effect of Solar System Scope Application-Based Learning Media on the Social Studies Learning Outcomes of Sixth-Grade Student of Karamatjaya Elementary School

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Abstract

This research is motivated by the low learning outcomes of sixth-grade students of Karamatjaya Elementary School in the social studies subject, particularly the abstract topic of the solar system. This condition is caused by conventional learning and the minimal use of technology-based media. This study aims to determine the effect of using the solar system scope application-based learning media on the social studies learning outcomes of sixth-grade students of Karamatjaya Elementary School.

The study used a quasi-experimental method with a nonequivalent control group design. The study population was all 28 sixth-grade students of Karamatjaya Elementary School. The sampling technique used total sampling. The sample was divided into an experimental group and a control group, each consisting of 14 students. Data collection used a pretest and a posttest consisting of 20 multiple-choice questions, which were tested for validity and reliability. Data analysis was performed using normality, homogeneity, and hypothesis testing using the independent sample t-test.

The results showed that the average posttest score for the experimental group (86.43) was higher than that of the control group (67.86). The hypothesis test results obtained a significance value (2-tailed) of $0.000 < 0.05$, thus rejecting H_0 and accepting H_a . Therefore, it can be concluded that the use of the solar system scope application-based learning media significantly influenced the science learning outcomes of sixth-grade students at SDN Karamatjaya on the solar system.

Keywords: Learning media, solar system scope, science learning outcomes, elementary school.

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Introduction

The development of information technology has brought significant changes to the world of education, including the learning process in elementary schools. The implementation of the Independent Curriculum emphasizes student-centered learning through active, meaningful, and contextual learning experiences. Furthermore, the curriculum also encourages the use of technology as a tool to support more effective and engaging learning (Saragi et al., 2023).

One of the subjects in the Independent Curriculum is Natural and Social Sciences (IPAS), which integrates science and social studies concepts to enable students to understand various phenomena holistically. This subject includes abstract material, such as the solar system in sixth

grade elementary school. This material examines celestial objects that cannot be directly observed, requiring learning media that can visualize concepts more concretely. Learning success can be measured by student learning outcomes. Learning outcomes are an indicator of competency attainment after participating in the learning process. However, based on observations and interviews with sixth grade teachers at Karamatjaya Elementary School on December 8, 2025, it was discovered that students' social studies learning outcomes were still suboptimal. As many as 62% of students scored below the school's Minimum Completion Criteria (KKM), which is 70. These low learning outcomes are influenced by students' difficulty understanding abstract material, while the learning process is still dominated by conventional methods such as lectures and textbooks. Furthermore, supporting facilities such as smartboards, projectors, and laptops are available, but they are not being utilized optimally in learning. One effort that can be made to address this problem is the use of technology-based learning media. Learning media plays a role in helping teachers deliver material more clearly, engagingly, and interactively, making it easier for students to grasp the concepts being learned. The use of media appropriate to the characteristics of elementary school students can also support conceptual understanding and learning outcomes (Wardani, Kusumaningsih, & Kusniati, 2024).

One media that can be utilized in science lessons on the solar system is the solar system scope application. This application presents realistic and interactive three-dimensional (3D) visualizations of the solar system, helping students understand the characteristics and movement of the planets. Furthermore, this application provides information about each planet, making learning more concrete, engaging, and tailored to student characteristics (Hidayat et al., 2024).

Although technology-based learning support facilities are available at Karamatjaya Elementary School, their utilization in science and science learning is still suboptimal. Furthermore, the school has never used the solar system scope application for solar system material. This situation suggests an opportunity to utilize the solar system scope application as an alternative learning medium for solar system material.

Based on this description, this study aims to determine the effect of using the solar system scope application on sixth-grade students' science learning outcomes in solar system material at Karamatjaya Elementary School. The results of this study are expected to provide alternative technology-based learning media to support the science and science learning process in elementary schools.

Method

This study employed a quantitative approach with a quasi-experimental method and a nonequivalent control group design. The study involved two groups: an experimental group treated with a solar system scope application, and a control group treated with conventional learning. Both groups were given a pretest before the treatment and a posttest after the learning.

The study was conducted at Karamatjaya Elementary School, with all 28 sixth-grade students as subjects. The sampling technique used total sampling, so the entire population was sampled, then divided into 14 students in the experimental group and 14 students in the control group based on the odd-even attendance schedule.

The research instrument was a 20-item multiple-choice test, which was declared valid and reliable through instrument testing. Data were analyzed using IBM SPSS Statistics version 27 through descriptive analysis, normality tests (Shapiro-Wilk), homogeneity tests (Levene statistic), and hypothesis testing using an independent sample t-test. Testing was conducted at a 5% significance level ($\alpha = 0.05$).

Results and discussions

Results

Table 1. Average Pretest and Posttest Results

Group	Number of Students	Mean Pretest	Mean Posttest
Experimental	14	39,64	86,43
Control	14	40,36	67,86

Based on the table above, the average pretest score for the experimental group was 39.64, while for the control group it was 40.36. After the learning process was completed, the average posttest score for the experimental group was 86.43, while for the control group it was 67.86. These results indicate that the average posttest score for the experimental group was higher than that of the control group.

1. Normality Test Results

Table 2. Shapiro-Wilk Test Results

		Tests of Normality			Shapiro-Wilk		
		Kolmogorov-Smirnov ^a					
Group		Statistic	df	Sig.	Statistic	df	Sig.
results	pretest control	,160	14	,200*	,971	14	,890
	posttest control	,244	14	,023	,883	14	,063
	pretest exsperimental	,155	14	,200*	,933	14	,336
	posttest	,171	14	,200*	,930	14	,301
	exsperimental						

Based on the normality test results above, the Shapiro-Wilk significance value for the control group was 0.890 for the pretest and 0.063 for the posttest, which is greater than 0.05. Furthermore, the experimental group obtained a significance value of 0.336 for the pretest and 0.301 for the posttest, which is greater than 0.05. Therefore, the data can be declared normally distributed.

2. Homogeneity Test Results

Table 2. Levene Statistic Test Results

		Test of Homogeneity of Variance			
		Levene Statistic	df1	df2	Sig.
results	Based on Mean	1,284	3	52	,289
	Based on Median	,900	3	52	,448
	Based on Median and with adjusted df	,900	3	40,272	,450
	Based on trimmed mean	1,194	3	52	,321

Based on the calculation results in the image above, a significance value greater than 0.05 was obtained so that it can be stated that the data variance between the control and experimental groups is homogeneous.

3. Hypothesis Test Results

Table 3. Independent Sample T-Test Results

		Independent Samples Test			
		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
results	Equal variances assumed	,000	-18,571	3,927	-26,644
	Equal variances not assumed	,000	-18,571	3,927	-26,648

Based on the results of the independent sample t-test calculation in the image above, it is known that the Sig. (2-tailed) value is $0.000 < 0.05$ so it can be concluded that H_0 is rejected and H_a is accepted. Thus, it can be concluded that the use of learning media based on the solar system scope application has an effect on the learning outcomes of science subjects on the solar system of grade VI students at SDN Karamatjaya.

Discussions

This research was conducted at Karamatjaya Elementary School on April 28–30, 2026, involving 28 sixth-grade students. The study spanned three sessions on the solar system. Prior to the lesson, all students took a pretest to assess their initial abilities. Next, the students were divided into two groups: an experimental group (14 students) using the solar system scope app-based learning media, and a control group (14 students) using conventional learning. After the three sessions, both groups were given a posttest to assess student learning outcomes.

In the experimental group, the lesson spanned three sessions. The first session covered the basic concepts of the solar system and the sun as the center of the solar system. The second session covered the definition of planets, the order of the planets, and the classification of inner and outer planets. The third session discussed the characteristics of each planet and administered a posttest. During the lesson, the teacher displayed the solar system scope app on the smartboard so students could directly observe the material and actively participate in the learning activities.



Figure 1. Learning Implementation in the Experimental Group

The results showed that the average posttest score for the experimental group was higher than that of the control group. Furthermore, the independent sample t-test obtained a 2-tailed value

of 0.000 (<0.05), indicating that the use of the Solar System Scope app significantly impacted the sixth-grade students' learning outcomes in the solar system subject at Karamatjaya Elementary School.

This effect is likely due to the Solar System Scope app's ability to present solar system material in an interactive, three-dimensional (3D) visual format. Through the app, students can more clearly observe the structure of the solar system, the positions of the planets, and the characteristics of each planet. These visualizations help students grasp abstract concepts, making the material easier to understand than if presented solely through lectures and textbooks.



Figure 2. Solar System Scope App Display

During the learning process, students in the experimental group also demonstrated more active engagement. They paid attention to the visualizations displayed, asked questions, discussed the material, and provided feedback on the material being studied. In contrast, learning in the control group focused more on teacher explanations, limiting students' opportunities to directly observe the learning materials. This situation suggests that the use of technology-based learning media can create a more engaging learning experience and help students understand the material more concretely.



Figure 3. Learning Implementation in the Control Group

The results of this study align with the opinion of Wardani, Kusumaningsih, and Kusniati (2024), who stated that the use of learning media appropriate to the characteristics of elementary school students can help improve conceptual understanding and learning outcomes. Furthermore, Hidayat et al. (2024) explained that students in the digital era tend to understand material more easily through visual and interactive learning media. Therefore, the solar system scope application can be an effective alternative learning medium in science learning, particularly for solar system

topics.

Conclusion

Based on the research results, it can be concluded that the use of learning media based on the solar system scope application has a significant effect on the learning outcomes of science and natural sciences on the solar system material of sixth grade students at Karamatjaya Elementary School. This is indicated by the average posttest score of the experimental group (86.43) which is higher than the control group (67.86) and the results of the independent sample t-test which obtained a significance value (2-tailed) of 0.000 (<0.05), so that H_0 is rejected and H_a is accepted. The use of the solar system scope application helps present abstract solar system material to be more concrete through three-dimensional and interactive visualizations, so that it can support the science and natural sciences learning process in elementary schools.

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