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THE EFFECTIVENESS OF SMART BOX MEDIA WITH PROBLEM-BASED LEARNING MODELS IN IMPROVING SCIENCE LEARNING OUTCOMES OF GRADE IV STUDENTS IN PUBLIC ELEMENTARY SCHOOLS

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Abstrack

This study aims to assess how well the Smart Box tool works to determine the effectiveness of Smart Box media in improving science learning outcomes for 4th grade students in elementary schools. The approach applied is an experimental study using an Unequal Control Group design, consisting of two groups: an experimental group consisting of 27 students and a control group consisting of 28 students. Information was collected through learning outcome assessments using pre-tests and post-tests. The average initial score of the experimental group was 65.30. After using Smart Box Media, the average experimental group increased to 89.00. While the average Pretest of the control class was 64.07, increasing to 70.36. These findings indicate that by using Smart Box media, learning outcomes are higher and can make students active, collaborative and increase understanding of the material that has been delivered by the teacher. This study concludes that Smart Box media is effective for improving science learning outcomes in elementary schools.

Keywords: Smart Box, students, problem based learning

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INTRODUCTION

Education is a conscious effort to improve abilities and encourage students to learn new experiences in life (Kusumaningtyas et al., 2024). Clear models, media, techniques, and learning objectives are all integral parts of the educational process (Nurfadillah et al., 2021). The method used to achieve success in student learning is to use good learning media and learning models. Learning media is also an important component for improving success of learning activities (Andri et al., 2023). Therefore, these learning media and models are the most important parts of learning that must be present.

Learning media that is aligned with learning activities can produce more effective learning processes and outcomes. Us of learning tools can play an important role in the learning process and learning resources presented by educators are optimally understood and accepted by students (Sapriyah, 2019). In reality, many elementary school students still struggle with science lessons because educator do not use learning media that is appropriate for the material.

After conducting observations at Gugus KRT. Radjiman Widyadiningrat Kendal Public Elementary School, specifically for science lessons, it was found that many students still had low science learning outcomes. Furthermore, the media used by educator was not very innovative and was teacher-centered. To address the existing problem, this research leads to on the effectiveness of Smart Box media as a real-world medium implemented using the Problem-Based Learning model. The use of this media is expected to increase the grades of fourth-grade students at KRT Radjiman Widyadiningrat Elementary School, Kendal. Smart Box media is a concrete learning medium in a box shape containing picture cards and teaching materials, which educator used to provide learning materials directly to students.

Smart Box is a media in the form of a picture box containing learning materials. This smart box can help students practice their motor skills, focus, patience, and abilities. This medium can also help students increase their curiosity about learning (Polinda et al., 2023). Smart Box is a two-dimensional box containing learning materials that students can use during teaching and learning activities (Sukaryanti et al., 2023).

Previous supporting studies have been conducted by Sudarto, Muhammad Amin, and Suriana, entitled "The Effect of Smart Box Media on the Science Learning Outcomes of Fourth Grade Students at Public Elementary School 216 Talungeng." Previous research has shown that the effective use of Smart Box media to enhance the science learning outcomes of fourth-grade students. Students at SD Negeri 216 Talungeng, Barebbo District, Bone Regency. This is evidenced by a significant increase in students' science achievement before and after using Smart Box, with the average post-test score being higher than the average pre-test score (Sudarto et al., 2024).

Another study was conducted by Citra Prameswari, Dewi Nila Andriani, and Rahayu Diningsih entitled "The Application of Smart Box Media through the Problem-Based Learning Model in Grade VI Science Learning at Sangen 02 Public Elementary School: Nervous System Material." Based on the researchers' findings, it was seen that the level of learning completeness in recent times using Smart Box media before learning using Smart Box media had a completion rate of 58.25%, and after using Smart Box media, it had a completion rate of 75%. There was an increase in the level of learning completeness in recent times and after using Smart Box media. Smart Box media can be said to be able to improve students' grades and make students more enthusiastic when participating in learning (Prameswari et al., 2025).

Researchers used Smart Box learning media in science lessons so that students would be enthusiastic during learning activities and their grades will be higher because they use the effective Smart Box learning media. Smart Box learning media is a learning tool for explaining material so it's easy to understand (Apulisa, 2024). By using Smart Box media as an educational game tool that combines energy transformation material and various challenges that can be solved through games (Mihwatun et al., 2024).

Another study was conducted by Octavia Dwi Widjayanti, Hendratno, and Adika Hanafia entitled "The Application of Smart Box Media to Improve Learning Outcomes of Third Grade Students on the Subject of Energy Forms and Sources". Based on the results of the researcher's study, it can be seen that there is an increase in learning outcomes after implementing the smart box media, which before using the media was 17.2%, and after using the Smart Box media, learning increased to 89.6%. The average significant increase in learning scores shows that after the implementation of the Smart Box media, learning has a very influential effect on learning (Widjayanti et al., 2024). The Smart Box media in this study is different from previous studies located in the box containing learning materials that are designed to be simple, attractive, and easy to use by students. Students gain experience in dealing with real-world problems through Problem-Based Learning, which is achieved through a series of learning activities that emphasize and focus on the process of understanding how to solve a problem. Problem-Based Learning also emphasizes the use of communication, collaboration, and existing resources to formulate ideas and develop reasoning skills. Higher-order thinking skills, or critical thinking skills, are deliberate and conscious processes for interpreting and evaluating data from previous experiences, beliefs, and abilities to test opinions or ideas (Halimah et al., 2023).

Smart Box not only contains a collection of materials, but is also equipped with question cards to present problems related to learning materials and uses a problem-based learning model, then students are divided into several groups to answer questions that are already available, then students work on questions in groups, then students play using Smart Box media by pairing images of roles in the school and community environment and their tasks in pockets in the Smart Box media, in this study Smart Box media is designed to increase students' curiosity through activities answering questions, discussions, and playing grouping images with the right tasks, so that the learning process becomes more active, fun, and meaningful.

Therefore, this study aims to determine the extent to which Smart Box media can improve student learning outcomes compared to before using this media. Thus, this study is expected to provide an overview to know before and after the use of this media during learning. The formulation of the research problem that can be raised is whether Smart Box Media with the Problem Based Learning model is effective for the learning outcomes of fourth grade science students of SD Negeri Gugus KRT.Radjiman Widyadiningrat Kendal.

METHOD

This study uses a quantitative method, specifically an experimental design. An experimental design is used to determine how independent variables (treatment) affect dependent variables (results) under controlled conditions (Sugiyono, 2023). In general, experimental research can be conducted in social research and educational research (Arib et al., 2024).

Research Design

The research design used was the Nonequivalent Control Group Design. Based on this design, the researcher first established two randomly selected groups, namely the experimental group and the control group. Each group received different learning treatments. Before the treatment was given, both groups first took a preliminary test to determine the students' initial abilities. Next, the experimental group received the learning treatment, while the control group did not receive the same treatment. The final stage of the study was conducted by comparing the results of the initial and final tests of both groups to determine the differences in learning outcomes obtained (Sugiyono, 2023).

Research Objective

This study was conducted on fourth-grade students at public elementary schools. The study used two classes, Public Elementary School 02 Jungsemi for the experimental class and Public Elementary School Kangkung for the control class.

Data Collection Techniques

This research uses data collection. techniques through tests, consisting of a pretest and a posttest. Test are one of the instruments used before and after learning, and student learning outcomes can be assessed using these tests. If a test meets the requirements or guiding principles used in its development, then it can be considered a good measuring tool (Surya et al., 2023). The use of valid and reliable instruments is crucial for obtaining valid and reliable research results. Using instruments that have undergone validity and reliability testing does not guarantee that the research results (data) are reliable and valid. (Sugiyono, 2023) Internal and external validity are present in instruments. Rational validity is internal validity. Instruments with internal validity are developed using comprehensive, current, and relevant ideas. Relevance refers to hypotheses that share the same name as the variables being studied.

Construct validity, on the other hand, refers to instruments used to measure a situation to facilitate explanation. This is still related to the analysis of construct validity and content validity. The instrument developed by the researcher is then consulted with an expert, namely the supervising lecturer, for input regarding the instrument. To obtain empirical validity results, the results of construct validity and content validity trials can be seen. A valid instrument will ultimately produce valid data.

Criteria	Question Number	Amount
Valid	1,2,3,4,5,6,8,10,11,14,16,17,18,19,20,22,23,25, 26,28,31,32,35,36,37,38,40,41,43,44,46,49,50	33 Question
Invalid	7,9,12,13,15,21,24,27,29,30,33,34,39,42,45,47, 48	17 Question

Figure 1. Validity test analysis results

The researcher conducted a trial test instrument trial in the form of 50 questions used to test questions in class V SD Negeri 02 Jungsemi. Each correct answer was given a score of 1, while the wrong answer was given a score of 0. Based on the results of the trial questions with a total of 50 questions for class V students of SD Negeri 2 Jungsemi, 33 valid questions and 17 invalid questions were obtained. The calculation results can be seen in the Table 1.

Table 1. Instrument reliability results

N	$R_{calculated}$	R_{table}	Reliability	Criteria
18	0.917	0.468	Reliable	Very high

Based on the results of the instrument reliability analysis in the test questions, the calculated r value was 0.917. Then, the calculated r value was compared with the r table value of N = 18 using a significance level of 5% then the rtable obtained is 0.468. Therefore, it can be concluded that the value is said to be reliable if rcount ≥ rtable with very high criteria. For data analysis techniques, we used normality tests, homogeneity tests, t-tests, and N-gain tests.

In the Smart Box media there are question cards containing real problems that students will have to discuss, then students with their group mates identify the problems on the question cards, after that write down the answers that have been discussed previously and then present them with group mates, learning continues by playing with the Smart Box media there are pictures of roles in the school environment and society, students then line up to group roles that match their duties, after that the teacher gives questions to students that students must answer, then students work on LKPD questions and then make presentations and are responded to by classmates, teachers and students reflect after the learning ends.

RESULTS AND DISCUSSION

This study focuses on the effectiveness of Smart Box media combined with the Problem-Based Learning (PBL) model in improving the science learning outcomes of fourth-grade students at SD Negeri Gugus KRT Radjiman Widyadiningrat Kendal.

The effectiveness of Smart Box learning media with the Problem Based Learning model can be determined by using the Pretest and Posttest scores. Post-tests measure students cognitive learning outcomes before and after learning activities. To determine initial competencies of students in the experimental and control classes, pre-tests were conducted before learning activities (treatment) so that later the initial abilities could be compared and conclusions could be drawn in accordance with the researcher's hypothesis based on the post-test scores after treatment.

For the experimental class, Smart Box learning media was applied combined with the Problem-Based Learning model, and for the control class, the learning used PowerPoint media with the Problem-Based Learning model. Before conducting the research, the researcher conducted a prerequisite test on students of SD Negeri Gugus KRT.Radjiman Widyadiningrat with a normality test on the learning outcomes that would be used as sample members. The normality assessment was conducted on data obtained from both the experimental group and the control group. was carried out using the Kolmogorov–Smirnov test with the help of SPSS version 25. At a significance level of 5%, the data is declared to have a normal distribution if the significance value in the Kolmogorov–Smirnov column shows results greater than 0.05. The results of the normality test are as follows:

Table 2. One-sample Kolmogrov-Smirnov test

	Jungsemi 1	Jungsemi 2	Jungsemi 3	Kangkung	Karalang1	Karalang 2
N	25	27	22	28	21	14
Mean	63.80	65.22	63.91	69.39	65.71	67.43
Asymp Sig (2-tailed)	.0,80	.0,61	.166	.070	.192	.145

According to the data calculated using SPSS Statistics 25, a significance level of > 0.05 was obtained for six public elementary schools in the KRT.Radjiman Widyadiningrat cluster. In this case, it can be confirmed that the data is normally distributed.

Using SPSS version 25, a homogeneity test was conducted. The results of the homogeneity test for science learning outcomes at KRT.Radjiman Widyadiningrat Kendal Public Elementary School are as follows:

Table 3. Test of homogenity of variances

		Leveane Statistic	df1	df2	Sig.
Score	Based on Mean	1.249	5	131	.290

Based on the homogeneity test of the IPAS learning outcomes of public elementary schools in the KRT.Radjiman Widyadiningrat Kendal Cluster, the significant value of 0.290 > 0.05 indicates that the variance of public elementary schools in the KRT.Radjiman Widyadiningrat

Kendal Cluster is homogeneous. It was found that the population consisted of fourth-grade students from six public elementary schools in the KRT Cluster, Radjiman Widyadiningrat Kendal. Normality and homogeneity tests were conducted on the initial data of the research population. The test results showed that the data from the six schools had a normal distribution and were homogeneous. Next, two classes were designated as the experimental class and the control class for the implementation of the research. Therefore, sampling techniques were used in this consideration. Sampling technique is a method of taking samples. Several sampling procedures are used to select samples to be used in research. In this study, the Purposive Sampling technique (Sugiyono, 2023). Purposive sampling is the determination of samples by considering certain factors. The factors used are the number of students, which is approximately the same; the proximity of the schools, which makes it easy for researchers to reach both schools; and the willingness of educator whose classrooms can be used for research at a time determined by the researchers (Sugiyono, 2023). So the researchers determined the research sample to be fourth-grade students at Jungsemi 2 Public Elementary School and fourth-grade students at Kangkung Public Elementary School. The experimental class was Jungsemi 2 Public Elementary School, with 27 students, while the control class was Kangkung Public Elementary School, with 28 students. The consideration for selecting these two schools was that they were both homogeneous and had approximately the same number of students.

The Researchers conducted a normality test on the pretest data to determine whether the science scores of fourth-grade students at SD Negeri 02 Jungsemi and SD Negeri Kangkung were normally distributed. Data were declared normally distributed if the significance value obtained was > 0.05.

Table 4. One-sample Kolmogrov-Smirnov test

	Experimental	**Control**
N	27	28
Asymp. Sig. (2-tailed)	.200	.200

The normality of the pre-test dataset was checked through a normality testing procedure for the control and trial classes using SPSS version 25 resulted in a significance value of the pretest score > 0.05. In the control class, there was a significance value of 0.200, while in the experimental class it was also 0.200, so both pretest data in both classes had a normal distribution. Next, a homogeneity test of the pretest data was conducted.

The outcomes of the preliminary homogeneity test are presented in the table below.

Table 5. *Test of Homogeneity of Variances*

		Levean e Statistic	**df 1**	**df 2**	**Sig.**
Result	Based on Mean	.120	1	53	.730

Based on the homogeneity test of the preliminary data presented in the table, the significance value obtained was 0.730, which exceeds the threshold of 0.05. This finding indicates that the pre-test data from both the control group and the experimental group are homogeneous. groups can be considered homogeneous. After assessing normality and homogeneity, the researchers proceeded to conduct a test that evaluates the equality of means in the initial (pre-test) data. It is employed to determine the presence of any differences in baseline scores between the experimental and control groups.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pretest	Equal variances assumed	.120	.730	.711	53	.480	1.225	1.723	-2.232	4.681
	Equal variances not assumed			.710	52.649	.481	1.225	1.725	-2.235	4.685

Figure 2. Independent samples test

The value found in the Equal Variances Assumed row is the value that will be used. From the test of the independent sample t-test on the pretest data, a t-value of 0.711 and a table t-value of 2.006 were obtained at a significance level of 0.05 with a degree of freedom (df) of 53. Because the t-value is smaller than the table t-value (0.711 < 2.006), the null hypothesis (H0) is accepted. Based on the results above, it shows if there are no difference in the average learning outcomes between students in the control class and the experimental class, so namely the first potential of the two classes can be said to be equal before being given treatment.

Table 6. One-sample Kolmogrov-Smirnov test

	Experimental	**Control**
N	27	28
Asymp. Sig. (2-tailed)	.119	.187

From the data obtained above, the normality test shows that the posttest significance value in the experimental class is 0.119 > 0.05 and in the control class is 0.187 > 0.05. This indicates that the posttest data in both classes are normally distributed. Furthermore, a homogeneity test was conducted on the final data to determine the similarity of variance between the experimental class and the control class based on the posttest results obtained.

Table 7. Test of homogeneity of variances

		Leveane Statistic	df 1	df 2	Sig.
Result	Based on Mean	.582	1	53	.449

The homogeneity test results in the posttest in the experimental class and control class obtained a significance value of 0.449 > 0.05, so it can be concluded that both classes have homogeneous variance. After the requirements for normality and homogeneity in the final data are met, After that, the researcher conducted a test of the average difference in the posttest data to determine the effectiveness of using Smart Box. The mean difference The testing procedure was implemented through the use of an independent sample t-test through the SPSS version 25 program. The results can be seen in Figure 3.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Posttest	Equal variances assumed	.582	.449	8.490	53	.000	18.643	2.196	14.239	23.047
	Equal variances not assumed			8.536	49.823	.000	18.643	2.184	14.256	23.030

Figure 3. Independent sample test

The results used for the test are the values in the row labeled "Equal Variances Assumed". Regarding the results of the independent sample t-test related to post-test information, the calculated t-value is 8.490, while the table t-value is 2.006, considering a significance level of 0.05 and 53 degrees of freedom (df) for two-tailed assessment. Since the calculated t-value exceeds the table t-value (8.490 > 2.006), the alternative hypothesis (Ha) is accepted.

The formula used to calculate normalization gain is as follows:

$$N\ Gain = \frac{Score\ posttes - Score\ pretest}{Score\ Ideal - Score\ Pretest}$$

a. Calculation of N-Gain for the Experimental Class

$$N\text{-}Gain = \frac{89.00 - 65.30}{100 - 65.30}$$

$$N\text{-}Gain = \frac{23.7}{34.7}$$

N- Gain = 0.17506

b. Calculation of N-Gain Control Class

$$N\text{-}Gain = \frac{70.36 - 64.07}{100 - 64.07}$$

$$N\text{-}Gain = \frac{6.29}{35.93}$$

N- Gain = 0.17506

Class	Average		N-Gain	Category
	Pretest	*Posttest*		
Experimental	65,30	89,00	0,68299	Currently
Control	64,07	70,36	0,17506	Low

Figure 4. N-gain test results

Based on Figure 2, Learning outcomes in this experimental class improved and received an N-Gain score of 0.68299 > 0.30, thus falling into the moderate category. Meanwhile, the control class obtained an N-Gain value of 0.17506 < 0.30, which is included in the low category. These data indicate that there is a difference between the experimental class and the control class in terms of the average increase in pretest and posttest scores. are presented in the following line diagram:

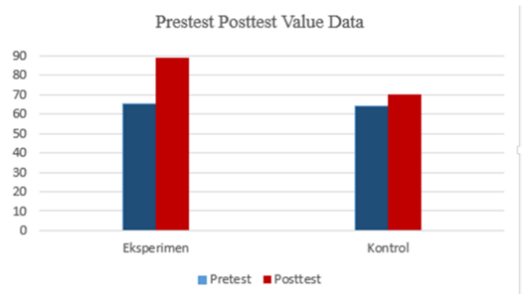

Figure 5. Pretest and posttest value diagram

Based on the tables and diagrams presented, The average pretest score for the experimental class was 65.30, rising to 89.00 in the posttest. Meanwhile, the average pretest score for the control class was 64.07, rising to 70.36 in the posttest.

DISCUSSION

In this study, researchers determined students' abilities at the beginning of the study before treatment was administered by conducting a pretest, with average scores of 65.30 for the experimental class and 64.07 control class. from the existence of that thing two results, it can be concluded that student learning outcomes are the same as data distributed normally and have homogeneous data variance. In addition, the t-value calculate 0.711 with the 2006 t-table, as well as df = 53 with a significance level of 0.05 with a two-tailed test. Because the calculated t-value of 0.711 is less than the 2006 t-table, Ho is accepted, indicating that there is no difference in the average science learning outcomes of students in the experimental and control classes before the treatment was given.

Before administering the treatment to both classes, the researcher controlled variables to reduce external influences, including the number of students, students' initial skills, the number of learning sessions, comparable learning spaces, and the same learning materials, which were the control variables in this study. This control was carried out so that external variables would not interfere with the treatment, thereby ensuring So from the results of learning scores of the experimental group were effective due to the treatment received.

The pretest results were used to evaluate the student skill, with the same average between the two classes. During the learning process, each class held six meetings consisting of one pretest, four lessons, and one posttest in each class with the same subject matter, namely my role in the school and community. The media used for the experimental group was Smart Box with a problem-based learning model.

Controlling these variables was used to reduce external variables that would come into play when administering the treatment, which resulted in increased value acquisition for grade 4 students at State Elementary School 02 Jungsemi due to the administration of a treatment, namely the use of Smart Box learning media with the Problem-Based Learning model.

After providing learning media to the trial class, namely Smart Box media, and the control group using PowerPoint media without any treatment, the expert executed a posttest with the aim of determining the final results of science scores. The importance of checking whether data has a normal distribution and homogeneous variance becomes clear when applied to posttest data before conducting hypothesis testing. Normality testing aims to test whether regression models, confounding variables, or residuals have a normal distribution or not (Novia et al., 2025).

Next, to determine whether data analysis for hypothesis testing can be continued or not, it is necessary to test the analysis requirements. In order to meet the prerequisite test before analyzing with the first test (T-test), several tests must be used, The data analysis stages included normality and homogeneity tests. Next, the final hypothesis was tested using a t-test, followed by an N-Gain test to determine the progress in learning outcomes between the experimental and control classes. (Ningsih & Nugraha, 2024).

The researcher conducted a normality test and a homogeneity test for the pretest before testing the hypothesis. The average posttest score for the experimental class was recorded at 89.00, while the control class was 70.36. The results showed that the posttest data in both classes were normally distributed, marked by a significance value of 0.119 for the experimental class and 0.187 for the control class, both > 0.05, and had a homogeneous variance with a significance value of 0.449. Furthermore, the average difference test was carried out using the t-test, resulting in a calculated t-value of 8.490 which is greater than the t-table of 2.006 with df = 53 at a two-way significance level of 0.05. These results indicate a significant difference in the posttest average between the experimental and control classes.

Next, the N-Gain test was conducted so that researchers could determine the increase in science learning scores for the material "My Role in the School and Community" between the pretest and posttest scores of the experimental and control classes. The increase in science learning scores for the material "My Role in the School and Community" in the experimental class was 0.68299, which is considered moderate because 0.68299 > 0.30.

Meanwhile, the increase in learning outcomes in the control class was 0.17506, which is considered low because 0.17506 < 0.30. Therefore, The data obtained above shows that the average increase in the experimental class exceeded the increase in the control class, this confirms that the use of Smart Box media with the Problem-Based Learning model has contributed to improving the science learning outcomes of fourth-grade students at SD Negeri 02 Jungsemi.

No	Information	*Pretest*		*Posttest*	
		Experimental	Control	Experimental	Control
1	Number of Students	27	28	27	28
2	Average	65,30	64,07	89,00	70,36
3	High Value	76	76	100	89
4	Lowest Value	55	55	76	41
5	Students complete	7	5	27	15
6	Learning completion	25,92%	17,85%	100%	53,57%

Figure 6. Learning outcomes experimental and control

Based on the data in the image above, the average pretest score for the experimental class was 65.30, with the highest score being 76 and the lowest being 55, and only 7 students passed, resulting in a learning completion rate of 25.92%. In the posttest, the average score for the experimental class increased to 89.00 with the highest score being 100 and the lowest being 76, and all 27 students passed, resulting in a completion rate of 100%. Meanwhile, in the control class, the average pretest score was 64.07 with the highest score being 76 and the lowest being 55, with only 5 students passing, resulting in a completion rate of 17.85%. For the posttest, the average score increased to 70.36, with the highest score being 89 and the lowest being 41, with 15 students passing, and a completion rate of 53.57%. From these data, it can be concluded that the increase in the average posttest score in the experimental class was greater than in the control class.

It can be explained that theoretical implications are the result of research that is involved with the theory being studied in theoretical studies or with the expected theoretical application. The effectiveness of Smart Box media combined with the Problem-Based Learning model in science subjects is evident from the application of Smart Box media in the learning process. This media has proven to be an effective and practical learning tool, facilitating material understanding and improving the quality of learning. Furthermore, the effectiveness of Smart Box media is also reinforced by the results of the posttest average difference test, where the calculated t value of 8.490 is greater than the t table of 2.006.

The analysis of the mean difference showed that the experimental class's score was higher than that of the control class. This confirms that the application of Smart Box media with a Problem-Based Learning model was more effective in improving student learning outcomes in the experimental class than the use of PowerPoint media in the control class.

This is in line with previous research conducted (Baroroh et al., 2025). Based on the results of the study, some time ago the Smart Box media was implemented, with an initial percentage before using the media of 57.5%. After its use, the percentage increased to 75%. The percentage obtained was higher than when the Smart Box media was first implemented. And The results of this study are in line with research findings (Putri et al., 2024). Which showed that the results of increased learning completeness after using Smart Box media in the experimental class were 89% greater than the control class. Learning completeness increased both before and after using Smart Box media. It can be concluded that Smart Box media can improve student learning outcomes. Similar empirical support is also seen from research (Pratama et al., 2024). Which showed that after using the media, student learning outcomes increased by 87.5% with a very high category. Based on the results of the study, it can be concluded that the use of Smart Box media can increase interest in learning science.

This study is expected to make a positive contribution and presen as a reference for further research on the use of Smart Box media with the Problem-Based Learning model in other subjects. Overall, this research shows that Smart Box media with a problem-based learning model is suitable for improving the learning outcomes of elementary school students. From the perspective of cognitive learning theory, which tends to prioritize the learning process over the learning outcomes themselves, the development of this cognitive theory was also influenced by Gestalt psychology. According to Piaget, information is acquired through action, and a child's cognitive development is largely determined by how actively they think and interact with their environment. Learning activities are prioritized in every development of cognitive learning theory to help children understand their existing knowledge before using the thinking process. When using Smart Box media, students interact extensively with their group mates and actively think about the problems they need to solve. Furthermore, Constructivism Theory emphasizes that we construct our own knowledge. According to constructivist learning theory, teachers help students reach higher levels of knowledge while allowing children to intentionally use their own learning processes. Constructivist learning theory emphasizes activities that help students gain insight into their own lives. Teacher assistance also plays a crucial role in helping children discover their own knowledge.

To apply the learning theory related to this research, science learning using Smart Box media can provide the knowledge to understand and apply an idea independently. Teachers have used Smart Box media for students during the learning process, because this media can make it easier for students to understand and remember learning materials, so that later student learning outcomes will improve and be in accordance with expectations.

CONCLUSION AND SUGGESTION

Conclusion

This study shows that Smart Box media with Problem Based Learning model is effective in improving the learning outcomes of 4th grade elementary school students. This has been proven by the increase in the average score of the experimental class which was previously 65.30

increased to 89.00 while in the control class which was previously 64.06 only increased to 70.36. The T-test results also showed a significant difference between the posttest in the experimental class and the posttest in the control class. Thus, Smart Box Media with Problem Based Learning model can be used by teachers to improve student learning outcomes.

Suggestion

The application of Smart Box media is highly recommended to teachers and schools as a learning strategy in science subjects because it can improve learning outcomes, in addition it can make students active, improve critical thinking, collaborate with friends, and make it easier for students to remember the material that has been delivered by the teacher. Further research is expected to expand the sample size, use different materials and subjects, or combine Smart Box media with other learning models to obtain better results from the research that has been done.

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