JPPIPA 10(11) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

The Effectiveness of Problem Based Learning Model Combined with Talking Stick on IPAS Learning Outcomes

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Received: April 15, 2024
Revised: August 20, 2024
Accepted: November 25, 2024
Published: November 30, 2024

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DOI: 10.29303/jppipa.v10i11.7391

Abstract: The objective of this study was to examine the effectiveness of Problem-Based Learning model combined with talking stick on IPAS learning outcomes. This research is experimental and uses a quantitative approach. The study design is quasi-experimental, utilizing a nonequivalent control group design. The study population consisted of fourth-grade students at SD Gugus Kemuning in Semarang City. The samples of this study were fourth-grade students of SDN Wonosari 02 and SDN Wonosari 03. Normality, homogeneity, t-test, and N-gain tests were used to analyze the data. The results showed that the Problem Based Learning model combined with talking stick is more effective in improving the IPAS learning outcomes compared to the conventional learning model. The t-test results demonstrate a significant difference between the IPAS learning outcomes before and after treatment, as evidenced by the t value > t table (9.00 > 2.05 and 11.10 > 2.05). This is also corroborated by the experimental class N-gain test results, which are 0.56 and 0.53 greater than the control class, respectively, at 0.29 and 0.24.

Keywords: Learning outcomes; Problem based learning; Talking stick

Introduction

Education is something that is very important in a person's life (Anggrayni et al., 2023). Rahman et al. (2022), education is an intentional and directed effort to establish a stimulating active learning environment in which students can build up their competencies, such as faith and spiritual strength, controlled behavior, intellectual capacity, integrity, and other competencies required by themselves and society. Suprianto et al. (2019) argue that education is a form of dynamic human culture and is full of developments that aim to prepare humans to face world challenges. Furthermore, Triwiyanto (2021) defines education as an effort to attract something in humans to provide various planned learning experiences, such as non-formal, formal, and informal education outside of school and school that lasts a lifetime and has the aim of optimizing various individual abilities so that they can play the role of life in the future appropriately. Thus, education can be interpreted as a process of conscious effort by individuals to gain knowledge, skills and attitudes through formal and informal education efforts.

The National Education System Law of the Republic of Indonesia Number 20 of 2003 states that the goal of national education is to help students reach their full potential and become human beings who are obedient to God Almighty, honorable, creative, independent, and capable of becoming democratic and responsible members of society. Educational goals can be achieved if there is cooperation from various parties, one of which is the teacher. Teachers play an essential part in achieving educational objectives (Sanjani, 2020). In order to achieve educational objectives, learning activities are carried out (Kabunggul et al., 2020). Khunaifi et al. (2019) define learning activities as a learning environment in which teachers, students, and learning resources interact. Teachers are required to be

How to Cite:
Mulyaningtyas, I., & Ahmadi, F. (2024). The Effectiveness of Problem Based Learning Model Combined with Talking Stick on IPAS Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *10*(11), 9700–9708. https://doi.org/10.29303/jppipa.v10i11.7391

able to create an atmosphere of effective learning activities. That way, teachers must be able to enhance their ability to design and implement learning activities, which include determining models, methods, strategies, learning media, teaching materials, and other devices that need to be customized according to the characteristics and requirements of students. The tools used in learning must be arranged systematically to create an atmosphere that allows students to learn (Raihan et al., 2018). In learning activities, teachers need to use innovative, creative, and learner-centered learning models. This is essential to help students become increasingly engaged and interested in educational activities, resulting in meaningful and enjoyable learning experiences. Alami et al. (2022) said that one of the things that can make the learning process run well is the application of a range of learning models that are appropriate in the class so that learning activities can run effectively.

Decree of the Head of the Education Standards, Curriculum and Assessment Agency of the Ministry of Education, Culture, Research and Technology Number 008/H/KR/2022 concerning Learning Outcomes in Early Childhood Education, Primary Education Level, and Secondary Education Level in the Merdeka Curriculum The written curriculum for Natural and Social Sciences (IPAS) studies the interactions between living and non-living objects in the universe as well as the individual and social aspects of human life. Natural science is, broadly speaking, the rational and systematic assembly of diverse knowledge via the consideration of cause and consequence.

Setyawan et al. (2021) suggested that IPAS is a creative process in finding various causes and effects of various phenomena that occur in the universe and its contents, events, and social interactions that occur in it. IPAS learning aims to develop students' curiosity and interest so that they can play an active role, develop inquiry knowledge, master themselves and their environment, and develop an understanding of the concepts in IPAS learning (Agustina et al., 2022). IPAS learning in elementary schools plays an important role so that students are able to understand things that occur in the surrounding nature. Teachers consequently have to be able to carry out IPAS learning activities optimally in order to achieve optimal results.

The IPAS learning process has been studied through observations and interviews with fourth grade teachers at SDN Wonosari 02 and SDN Wonosari 03 in Semarang City. The IPAS learning program in these two schools faces challenges as they have students with diverse abilities. Some students are fast learners while others are slow learners, which affects their learning outcomes. The teacher's application of syntax in the learning model used is unclear, and the learning methods employed tend to rely on lectures. Additionally, student enthusiasm for learning is lacking. According to Muhayati et al. (2023), learning outcomes issues may arise from less creative teaching models, strategies, and learning resources that make students uninterested in engaging in the learning process.

The researchers attempted to implement the Problem-Based Learning (PBL) model combined with talking stick, in response to the issues that arose at SDN Wonosari 02 and SDN Wonosari 03. According to Huda et al. (2021), the Problem Based Learning model is a student-centered approach that fosters active learning by encouraging students to discover, investigate, and solve problems on their own. This approach also trains students to be responsible for their own learning. The Problem Based Learning model is a learning model that uses real or authentic problems to gain knowledge and determine a decision taken to solve the problem (Fitriyyah et al., 2019). As a result, the Problem Based Learning model can be regarded as a learning model that focuses on solving problems associated with the learning material. Through the use of this learning paradigm, students can enhance their ability to solve problems, become more motivated to study, and think critically, actively, creatively, and cooperatively (Indriana et al., 2021). The syntax of the problem-based learning model is defined by Hanifah et al. (2021) as follows: introducing the problem to the class, setting up study groups and individual inquiry, guiding group and individual inquiry, producing and presenting work, and assessing and analyzing the problem-solving process.

Talking stick is one type of cooperative learning model. According to Nasroni (2020), a talking stick is a learning model that uses a stick where the last student holding the stick is required to answer the teacher's questions after learning the material. Rosdiani et al. (2022) also defined the talking stick learning model as an interactive learning model packaged in the form of a game to make learning more interesting. Thus, talking stick can be defined as a type of cooperative learning model in which the learning activities use stick and involve students in answering the teacher's questions after learning the learning material. In its implementation, students take turns holding the stick and then the last student holding the stick when the song stops is asked to give an answer or opinion related to the question asked by the teacher. The use of the stick in this lesson serves as a tool to facilitate communication and active participation of the students in the learning process. In addition, the stick is also used as a medium that is able to provide a touch of play and is able to increase student involvement during the learning process. Talking stick is able to promote communication, interaction of students with other students and teachers, and active participation of students in learning activities.

Therefore, talking stick can be an innovative alternative in learning activities.

Research conducted by Fitriana (2022) states that the Problem Based Learning model is effective and can improve the science learning outcomes of fifth grade students. Other research was also conducted by Negara et al. (2021) which revealed that the Problem Based Learning model can improve the science learning outcomes of fourth-grade students. Meanwhile, Rizkiana et al. (2022) conducted a study which stated that the talking stick learning model can enhance the learning outcomes of fifth grade students. Another study was also conducted by Aminah (2022) which revealed that the talking stick learning model could significantly increase student learning outcomes.

In this study, the Problem Based Learning model combined with talking sticks will be applied to the material of plant body parts because based on the results of classroom teacher interviews revealed that students have difficulty in understanding material about plant parts accompanied by their functions, types of roots, leaf bones, and stems. This causes students' learning outcomes on the material to be not optimal. The combination of these two learning models is done so that students are interested in learning activities because they will be invited to solve problems and also learn while singing. Indragani et al. (2021) argue that providing variations of learning models in learning activities is important and must always be considered by teachers because the more teachers provide variations of learning models, the more successful learning activities will be. Suryaningsih et al. (2021) revealed in their research that the combination of the Problem Based Learning model with talking stick can create fun learning and improve students' critical thinking skills.

This research is important and interesting to do because it is useful to test the effectiveness of the Problem Based Learning model combined with talking sticks on IPAS learning outcomes on the material of plant body parts which are expected to be able to develop science and technology, especially in primary education. The problem addressed in this study is whether there is a significant difference between the IPAS learning outcomes before and after using the Problem Based Learning model combined with talking stick for fourth-grade students at SD Gugus Kemuning Semarang City? Then, is the Problem Based Learning model combined with talking stick effective in improving the IPAS learning outcomes of fourth-grade students of SD Gugus Kemuning Semarang City?

Method

This study employs a quantitative approach through experimental research. The research design utilized a quasi-experimental design in the form of a non-equivalent control group design. The study population consisted of fourth-grade students at SD Gugus Kemuning in Semarang City. The sample of this study, namely fourth-grade students of SDN Wonosari 02 and SDN Wonosari 03. Each school has 2 classes that will be used as experimental and control classes. The total number of samples was 112 students.

Data collection techniques used in this study include test and non-test techniques which include interviews, observation, and documentation. Pre- and post-tests in the form of multiple choice questions were used as learning outcome tests. The data analysis techniques used were normality test, homogeneity test, t-test, and N-gain test.

Result and Discussion

The results of research on the effectiveness of the Problem Based Learning model combined with talking sticks on IPAS learning outcomes were obtained through cognitive tests conducted before and after treatment. This research begins with the implementation of pre-test in experimental and control classes which aims to determine the initial ability of students before being given treatment. After that, students in the experimental class will carry out learning by being given treatment, namely by applying the Problem Based Learning model combined with talking stick, while students in the control class continue to carry out learning, but are not given treatment. A post-test is then administered to both the experimental and control classes. Post-test data will determine the combined effectiveness of the two learning models on student learning outcomes. The following is a table of student cognitive learning outcomes in experimental and control classes in both schools.

The beginning talents of the experimental and control classes are nearly identical, as seen by tables 1 and 2 above. While the control class scored 58.71 on the pre-test, the experimental class at SDN Wonosari 02 had an average score of 60.07. Afterwards, the experimental class's average pre-test score at SDN Wonosari 03 was 59.04, whereas the control class's was 61.07. The experimental class's average post-test score at SDN Wonosari 02 was 81, compared to 70.07 for the control group. The control class scored 70.14 on the post-test at SDN Wonosari 03, while the experimental class scored 80.14 on average. The average post-test score for the experimental class is higher than the control class's, as seen by this. Comparing the pre-test and post-test scores, the experimental class's average rise was greater than that of the control group. The results show that the pre-test scores at SDN Wonosari 02 showed an increase in learning completeness from 25% to 75% in the post-test

score, whereas the control group had an increase from 28.57% to 50%, or 21.43%. Similarly, in SDN Wonosari 03, the experimental class's percentage of learning completion increased from 25% to 71.42% in the post-test, whereas the control class increased from 21.42% to 46.42%.

Table 1. Learning Outcomes of Students of SDN Wonosari 02

Data	Pre-test experiment	Pre-test control	Post-test experiment	Post-test control
N	28	28	28	28
Mean	60.07	58.71	81	70.07
Maximum	80	80	100	97
Minimum	43	43	53	50
Completeness	25%	28.57%	75%	50%

Table 2. Learning Outcomes of Students of SDN Wonosari 03

Data	Pre-test experiment	Pre-test control	Post-test experiment	Post-test control
N	28	28	28	28
Mean	59.04	61.07	80.14	70.14
Maximum	77	80	100	100
Minimum	43	43	57	50
Completeness	25%	21.42%	71.42%	46.42%

The identical minimum and maximum pre-test scores of 43 and 80 are also displayed in table 1. Findings from the post-test for the experimental class indicated that a score as low as 53 and as high as 100 might be achieved. In the meantime, the control class's post-test scores ranged from 50 to 97, the lowest and maximum being recorded. A maximum score of 77 is achieved by the experimental class and an 80 by the control group, as indicated by Table 2. Fourty-three is still the minimal pre-test score. After that, the experimental class's post-test minimum and maximum scores are 57 and 100, respectively, whereas the control class's post-test minimum and maximum scores are 50 and 100. These results reinforce the fact that the initial ability of the students before the treatment is the same because the minimum and maximum scores on the pre-test are almost the same. In addition, the minimum and maximum scores on the post-test were higher in the experimental class than in the control class.

In the experimental class, where talking sticks were used in conjunction with a problem-based learning model, students' cognitive learning outcomes were found to be more complete and on average than those of the control group using a conventional learning model. This conclusion can be drawn from the results of the pre- and post-tests in both the experimental and control classes. This is in line with the findings of Kristiana et al. (2021), who reported that the use of the Problem Based Learning approach significantly increased the amount of science instruction that elementary school pupils were able to complete. The problem-based learning model has a significant influence, as indicated by the learning model's effect size calculation, which yielded a score of 2.70. Likewise, Ariyani et al. (2021) stated that the Problem Based Learning model is effectively in increasing student learning outcomes. Based on data analysis, this learning model improved student learning outcomes from a low of 8.9% to 83.3%, with an average increase of 30%. Then, Faradita (2018) states that the talking stick learning model has an effect in improving students' science learning outcomes. Data analysis shows that the t-value is 19.03 > t-table of 2.00. This is also supported by the average pre-test score of 56.8, which increased to 71 at the time of the posttest. According to Mashadi (2019), talking stick learning methods have been found to enhanced learning results and student attention during the course of learning. The learning outcomes improved as evidenced by the average score increasing from 71.11 to 79.44 and then to 88.33. Additionally, the percentage increase rose from 35% to 68% and then to 96%.

The pre-test data homogeneity and normality tests were the first data analysis methods used in this investigation. To ascertain whether or not the data on learning outcomes are regularly distributed, a normality test is utilized. Using SPSS, the Kolmogorov-Smirnov test was used to evaluate whether the data were normal. If the significance value (sig) is greater than 0.05, the data is assumed to be normally distributed. Conversely, if the sig is less than 0.05, the data is not normally distributed (Priyatno, 2018). The following is the pre-test data normality test table.

Table 3. Pre-test Normality Test of SDN Wonosari 02

Test of Normality							
	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Experimental Pre-test	.15	28	.07	.93	28	.09
	Control Pre-test	.12	28	.20*	.94	28	.13

Table 4. Pre-test Normality Test of SDN Wonosari 03

Test of Normality							
	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Experimental Pre-test	.15	28	.07	.93	28	.06
	Control Pre-test	.10	28	.20*	.96	28	.47

Table 3 demonstrates the normal distribution of the SDN Wonosari 02 pre-test data, with a significance value of 0.2 for the control class and 0.07 for the experimental

class. Table 4 shows that the pre-test data for SDN Wonosari 03 is also normally distributed, with the experimental class pre-test significant at 0.07 and the control class at 0.2.

The homogeneity test was carried out to find out if the data variances in the control and experimental classes were similar. If both classes have the same data variance, the data is declared homogeneous. Testing is done using SPSS. According to Priyatno (2018), data is considered homogeneous if the significance value (sig) is greater than 0.05 and non-homogeneous if it is less than 0.05.

Table 5. Pre-test Homogeneity Test of SDN Wonosari 02

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Learning outcomes	Based on Mean	.60	1	54	.44
	Based on Median	.55	1	54	.45
	Based on Median and with adjusted df	.55	1	53.99	.45
	Based on trimmed mean	.60	1	54	.44

Table 6. Pre-test Homogeneity Test of SDN Wonosari 03

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Learning outcomes	Based on Mean	.27	1	54	.60
	Based on Median	.45	1	54	.50
	Based on Median and with adjusted df	.45	1	53.39	.50
	Based on trimmed mean	.28	1	54	.59

Table 5 shows that the significant value is 0.440, which is greater than 0.05, indicating that the SDN Wonosari 02 pre-test data are homogeneous. Likewise, the pre-test data of SDN Wonosari 03 because 0.60> 0.05 so that the data is homogeneous.

The final data analysis of this study includes normality and homogeneity tests for post-test data, a t-test, and an N-gain test. The outcomes of the post-test data normality test are presents below.

Table 7. Post-test Normality Test of SDN Wonosari 02

Test of Normality							
		Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
			Statistic	df	Sig.	Statistic	df	Sig.
Result	Experimental Post-test		.15	28	.08	.88	28	.00
	Post-test Control		.15	28	.09	.93	28	.06

Table 8. Post-test Normality Test of SDN Wonosari 03

Test of Normality							
		Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
			Statistic	df	Sig.	Statistic	df	Sig.
Result	Experimental Post-test		.14	28	.14	.93	28	.09
	Control Post-test		.13	28	.20*	.94	28	.13

According to Table 7, the post-test results for the experimental class have a significant value (sig) of 0.08, whereas the control class has a value of 0.09. This suggests that the SDN Wonosari 02 post-test data has a normal distribution. The post-test results of SDN Wonosari 03 are normally distributed, as indicated by Table 8's significant value (sig) of 0.14 for the experimental class and 0.2 for the control class. The post-test data homogeneity test results are presented below.

Table 9. Post-test Homogeneity Test of SDN Wonosari 02

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Learning outcomes	Based on Mean	.34	1	54	.55
	Based on Median	.23	1	54	.62
	Based on Median and with adjusted df	.23	1	49.61	.62
	Based on trimmed mean	.32	1	54	.56

Table 10. Post-test Homogeneity Test of SDN Wonosari 03

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Learning outcomes	Based on Mean	.07	1	54	.79
	Based on Median	.01	1	54	.91
	Based on Median and with adjusted df	.01	1	50.03	.91
	Based on trimmed mean	.05	1	54	.81

The significance value (sig) shown in table 9 is 0.55 > 0.05 so it can be said that the post-test data of SDN Wonosari 02 is homogeneous. Table 10 shows a significant value (sig) of 0.79 > 0.05, indicating that the SDN Wonosari 03 post-test data is homogeneous.

The t-test conducted in this study is the paired samples t-test. It is performed using SPSS. This test is conducted to determine whether there is a significant difference or major distinction before and after treatment. The table presented below displays the t-test results. If the t-value surpasses the t-table, H0 is rejected while Ha is accepted. Conversely, if the t-value is less

than the t-table, H0 is accepted and Ha is rejected (Priyatno, 2018).

Table 11 indicates that the t-value is negative, at -9.00. The t-value is negative due to the mean value of the pre-test is less compared to the mean of the post-test. In this case, the negative t-value can become positive, resulting in a t-value of 9.00. The t-table is 2.05. That way, the t-value > t-table because 9.00 > 2.05. Then, in table 12, the t-value > t-table because 11.10 > 2.05. Therefore, H0 is rejected, and Ha is accepted, indicating a significant difference in IPAS learning outcomes before and after applying the Problem-Based Learning model with a talking stick to fourth-grade students at SD Gugus Kemuning Semarang City.

Table 11. T-test of Experiment Class of SDN Wonosari 02

Paired Samples Test									
		Paired Differences							
				Std. Error Mean	95% Confidence Interval of the Difference				
		Mean	Std. Deviation		Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pre-test-Post-test	-20.92	12.30	2.32	-25.69	-16.15	-9.00	27	.00

Table 12. T-test of Experiment Class of SDN Wonosari 03

Paired Samples Test									
		Paired Differences							
				Std. Error Mean	95% Confidence Interval of the Difference				
		Mean	Std. Deviation		Lower	Upper	t	df	Sig. (2 tailed)
Pair 1	Pre-test-Post-test	-21.10	10.06	1.90	-25.00	-17.20	-11.10	27	.00

In this study, the N-gain test was conducted using SPSS. The N-gain test is employed to calculate the average increase in scores before and after the test between experimental and control classes. The following table shows the increase in pre-test and post-test scores of fourth-grade students at SDN Wonosari 02 and SDN Wonosari 03.

Table 13. N-gain test of SDN Wonosari 02

Class	Pre-test average	Post-test average	N-gain	Criteria
Experimental	60.07	81	0.56	Medium
Control	58.71	70.07	0.29	Low

Table 14. N-gain test of SDN Wonosari 03

Class	Pre-test average	Post-test average	N-gain	Criteria
Experimental	59.04	80.14	0.53	Medium
Control	61.07	70.14	0.24	Low

The table displaying the N-gain test results indicates that the experimental class outperformed the control class at both SDN Wonosari 02 and SDN Wonosari 03. Specifically, the N-gain value for the experimental class at SDN Wonosari 02 was 0.56, classified as medium, while the control class had a lower N-gain value of 0.29, classified as low. The N-gain criteria for the experimental class at SDN Wonosari 03 was classified as medium with an N-gain value of 0.53, while the control class was classified as low with an N-gain value of 0.24.

The N-gain test results indicate that the experimental class's average pre-test and post-test scores increased more than the control class's average pre-test to post-test scores. The average increase that occurs can be caused by interesting activities that make students interested in participating in learning (Rizki et al., 2023). Kurniawati et al. (2017) stated that things that can increase the interest of students to take part in learning activities are stimulation and games. According to Santosa et al. (2023), students' curiosity and high interest in learning activities can make them happy and make it easier for them to engage in learning. In this study, researchers combined Problem Based Learning and talking stick learning models which can make learning activities more interesting because in the process students are invited to play, sing, and of course learn.

According to the researchers' observations during learning activities, the students who received treatment were more active and enthusiastic in participating in learning than the classes that did not receive treatment. Students who received treatment or those in the experimental class responded enthusiastically to the teacher's apperception, listened with concentration when the teacher explained the material and guided the learning, and were very excited when they sang while passing the stick and answering questions. Students in the experimental class showed a higher level of participation, they were actively involved in group discussions, exchanging ideas and supporting each other in finding solutions to the problems given. In addition, they were also encouraged to develop critical

thinking skills by being given triggering questions by the teacher and they were also asked to solve problems that fit the learning context. During learning activities, learners are interested in solving problems so they are active in analyzing situations, identifying problems, and formulating solutions, both individually and in groups. This is in accordance with what was conveyed by Halimah et al. (2023) that the Problem Based Learning model is able to improve students' critical thinking skills. In learning activities every learner is given equal opportunity to speak and express their opinions, this encourages the involvement of all learners in the learning process and ensures that each individual's opinion is heard. Students are trained to develop communication skills by actively listening, clearly articulating their thoughts, and providing constructive responses to their peers' opinions. The experimental class students exhibited higher motivation and emotional engagement with learning because they felt in control of problem-solving and discovering new knowledge. Meanwhile, the students who did not receive the treatment or those in the control class were less enthusiastic during learning and less focused in paying attention to the teacher's explanation of the learning materials. The students in the control class exhibit passive learning behavior and are highly dependent on the teacher. Furthermore, their communication skills are limited due to the lack of opportunities to actively participate in group discussions. They appear disinterested and bored with the learning process due to the lack of active interaction and engaging activities.

The combined application of the two learning models in the experimental class was able to increase students' interest in learning, which certainly had an impact on students' learning outcomes. This is evidenced by the difference in the average increase which shows that learning by applying the Problem Based Learning model combined with talking stick is more effective in improving the IPAS learning outcomes of fourth-grade students of SD Gugus Kemuning compared to conventional learning models.

Conclusion

Based on the aforementioned research findings and discussions, it can be concluded that, when compared to traditional learning models, the Problem Based Learning model with Talking Stick is more successful in raising fourth grade students' IPAS learning outcomes at SD Gugus Kemuning Semarang City. The t-test findings demonstrate that the t value > t table, with 9.00 > 2.05 (SDN Wonosari 02) and 11.10 > 2.05 (SDN Wonosari 03), indicating this. For fourth-grade students at SD Gugus Kemuning Semarang City, the t-test findings demonstrate a significant difference in IPAS learning outcomes before and after adopting the Problem Based Learning paradigm in conjunction with the talking stick. The increased N-gain test results for the experimental class in comparison to the control class provide more evidence for this. N-gain values were obtained by the experimental class of 0.56 and 0.53, and by the control class of 0.29 and 0.24.

Acknowledgments

All praise is due to Allah Swt for his blessings so that this research can be completed properly. The researcher would like to thank the supervisor who has guided the researcher in carrying out the research. Thank you to the teachers and students who have helped in the implementation of this research. In addition, the researcher would also like to thank my family and friends for their prayers and support. Thank you to my biases who have given strength and comforted the researcher in carrying out the research. The researcher is grateful to all those who have helped and contributed to this research.

Author Contributions

Conceptualization, I.M. and F.A.; methodology, I.M.; data analyze using SPSS, I.M.; validation, F.A., formal analysis, I.M.; investigation, I.M.; resources, I.M.; data curation, I.M.; writing—original draft preparation, I.M.; writing—review and editing, I.M. and F.A.; supervision, F.A. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Conflicts of Interest

The researcher's objective for publishing this article is to meet the need for research outputs in the form of journal articles as evidence of performance. The authors declare no conflict of interest.

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