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The Effectiveness of Problem-Based Learning Snakes and Ladder Media in Social Studies for Class V Elementary School

Anggraheni, Binita*, Utaminingsih, Sri & Ismaya, Erik Aditia

[1]Universitas Muria Kudus, Kudus, Central Java 59327, INDONESIA

*Corresponding author email: anggrahenib@gmail.com

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Abstract: To address students' difficulties in understanding Social Studies (IPS) learning material, effective learning media is essential. This research and development project resulted in a Problem-Based Learning (PBL) based "snakes and ladders" media, created using Microsoft PowerPoint. The product is available as a CD or soft file, accompanied by a user manual, and can be played on computers, laptops, and Android phones. The PBL activities incorporated in the media include "Let's Observe," "Let's Read," "Let's Think," "Let's Create," and "Let's Review." The study aims to evaluate the effectiveness of the PBL-based snakes and ladders media in Social Studies for fifth-grade elementary school students. The research follows a research & development design, beginning with research and information gathering, planning, initial product development, product trials, product revisions, and culminating in the final product ready for use. Data collection involved interviews, expert validation questionnaires, and feedback from teachers and students. The data were analyzed both qualitatively and quantitatively. The media was tested in three elementary schools in the Gabus District. Results indicated the effectiveness of the PBL-based snakes and ladders media in Social Studies, as demonstrated by the paired-samples t-test, which showed that the scores of the experimental groups were significantly higher than those of the control group. The conclusion is that the PBL-based snakes and ladders media is effective in improving student learning outcomes.

Keywords: Effectiveness, media snakes, ladders, problem-based learning

1. Introduction

The aim of education is to develop the potential of students to become individuals who believe in and fear God Almighty, possess noble character, are healthy, knowledgeable, capable, creative, independent, and become responsible citizens in a democratic country. The achievement of these educational goals is largely determined by the learning process. It is hoped that through the learning process, students can experience positive changes in their knowledge, skills, and attitudes (Schecter, 2011).

The education process is a collective responsibility, with teachers playing a crucial role. Teachers are essential in the educational process because they interact directly with students and are responsible for organizing and facilitating their learning. As noted by Mahajan and Singh (2017), teachers have a significant impact on learning outcomes, as they directly engage with students, who are the focus of the 2013 curriculum. Consequently, the successful implementation of the 2013 curriculum heavily relies on the teachers' skills.

Social Sciences Education is a key subject in elementary schools (SD/MI), covering geography, history, sociology, and economics. Social Studies aims to equip students with reasoning skills and an understanding of values and norms. According to Permendikbud Number 21 of 2016, the scope of Social Studies includes human interactions, places and environments, continuity and change over time, social and cultural systems, and economic behavior and welfare. Therefore, Social Studies plays a vital role in helping students interact effectively within their families, schools, and communities. It also fosters an understanding of social relationships and promotes attitudes that reflect the identity of the Indonesian nation in all aspects of life (Kusmarni, 2016).

> *"In the learning process of it, students are expected to be able to gain the understanding of some concepts and develop attitudes, manner, morale, and skills based on their innate concepts. IPS does also*

*Corresponding author: anggrahenib@gmail.com

discuss therelationship between a human and the environment of where they grow and also the problems on the environment itself"

In the social studies learning process, students are expected to gain an understanding of various concepts and develop attitudes, morals, and skills based on these concepts. Social studies also explore the relationship between humans and their environment and address environmental issues. Therefore, teachers should provide learning experiences that go beyond knowledge acquisition, helping students to develop skills and behaviors that enable them to interact effectively within their families, schools, and communities. Herijanto (2012) supports this by stating that effective learning involves providing material that students can directly experience or observe, instilling essential values and concepts.

However, social studies lessons are often perceived as boring, with excessive material leading to student disinterest and a lack of enthusiasm (Jateng Pos, February 14, 2018). Pre-research interviews with teachers and fifth-grade elementary students in Gabus District, Grobogan Regency, revealed similar issues. Students reported that they often became bored when teachers simply lectured, and they struggled to understand the material, which was primarily text-based and required rote memorization. This indicates that teachers tend to focus on knowledge mastery, neglecting attitude and skill competencies.

Interviews with fifth-grade teachers in the same district highlighted problems with social studies instruction. Teachers reported that students frequently lost attention during lectures, and the lack of diverse teaching models resulted in a monotonous learning experience. Teachers rarely used learning media, and when they did, it was limited to basic tools like maps or pictures already available in schools.

The Covid-19 pandemic exacerbated these issues as learning shifted to online platforms. Teachers predominantly assigned tasks from textbooks and worksheets, leading to passive learning. Students merely completed and submitted assignments, showing little enthusiasm and easily giving up when faced with difficulties. Teachers and parents reported a decline in students' interest in learning during this period, attributing it to the overwhelming and tedious nature of assignments and the less conducive home learning environment. Social studies, with its extensive content and reliance on memorization, was particularly challenging.

As facilitators, teachers have the capability to create effective learning environments that align with students' characteristics, subject matter, and learning contexts. Ramadhani and Koryati (2018) emphasizes the need for teachers to implement innovative and effective teaching processes, including varied learning models and media, to foster a pleasant and meaningful learning atmosphere. Rudi (2017) also suggests that varied teaching methods can help overcome students' learning difficulties.

The use of diverse learning methods can be supported by learning media, which aid teachers in delivering material effectively. For elementary students, who are in the concrete operational stage of cognitive development, learning media are essential to help them grasp abstract concepts. Learning media can also create an engaging learning environment, boosting students' motivation and participation. Dwipangestu (2018) asserts that media usage in learning enhances understanding, presents reliable data attractively, facilitates data interpretation, and condenses information. Students using instructional media are generally more engaged than those who only listen to lectures.

In 21st-century education, technological advancements offer teachers tools to create engaging learning experiences. Fatta et al. (2019) notes that students today, often referred to as "Digital Natives," are surrounded by digital devices, altering their learning styles and abilities. Thus, teachers must innovate by integrating technology such as smartphones, computers, laptops, and the internet into their teaching practices to develop learning media aligned with educational objectives.

Instructional media should foster interaction, especially given the current necessity for remote learning due to the Covid-19 pandemic. An effective alternative is the development of snakes and ladders media. Oktafia and Fitrayati (2024) found significant differences in learning outcomes between students taught using snakes and ladders media and those who were not. Similarly, Marcela et al. (2022) also highlights the positive impact of snakes and ladders media on student learning. This reinforces the potential of using interactive and engaging media to enhance learning in social studies.

"The use of interactive media as a learning resource to broaden and increase knowledge and train students' independence to think creatively and innovatively in learning. The advantages of interactive media can be used anywhere, there is no space and time limit for students to study independently. The use of this media can demonstrate a learning activity that feels more alive, clarifying the presentation of written/oral subject matter"

The development of snakes and ladders media, created using PowerPoint, allows students to access the material via computers, laptops, and Android phones, making it versatile for both face-to-face and online learning environments. However, effective snakes and ladders media should not merely present material; it should also facilitate the analytical process and enhance students' thinking skills. These skills can be developed through activities such as observing, experimenting, reasoning, communicating, and concluding, which are integral components of the problem-based

learning (PBL) model. Therefore, incorporating PBL steps into the snakes and ladders media ensures that the material is engaging and educational.

In PBL, subject matter is presented through real-life problems that students must solve. This approach enables students to apply the knowledge and skills they acquire to everyday situations, making their learning more meaningful. Huijser et al. (2015) support this by stating, "In PBL, students habitually seek, analyze, synthesize, and apply information, with the guidance of the teacher, to resolve the problems presented to them at the outset." Thus, students become accustomed to critical thinking and problem-solving from the beginning of their learning process. Teachers can use authentic problems to increase students' interest and motivation through problem-solving activities. Previous research, such as Anggraeni (2017), has shown that PBL-based snakes and ladders media is effective for encouraging active and independent learning among students.

The snakes and ladders media developed in this study will not only include material that follows PBL steps but will also feature formative assessment questions. To enhance engagement, the media will incorporate games that challenge students to learn actively. The significance of games in elementary education is underscored by Veličković (2013), who argues that games play a crucial role in making learning more interesting and effective for young students.

> *"… we think is a significant possibility of using games in educational workwith children in the elementary grades, and how to help your child through the game more quickly and more easily overcome the problems of adaptation to the school environment and learning"*

The researcher chose to use the snakes and ladders game in this media because it is a familiar and engaging game for students, making it suitable for educational purposes. Tegeh and Budiartini (2017) argue that the snakes and ladders game can be applied to all subjects and enhances student interaction during the learning process. Previous research by Budiman et al. (2017) demonstrated that the development of interactive snakes and ladders game applications can help children learn basic mathematics by integrating questions into the gameplay. This approach can be adapted to transform the traditionally dull perception of social studies into an engaging and enjoyable learning experience. By developing problem-based learning (PBL) snakes and ladders media, students are more likely to develop an interest in social studies. Additionally, this media provides students with opportunities to develop essential life skills, such as problem-solving, finding solutions, and fostering independence, honesty, and responsibility.

2. Methodology

This study employs a Research and Development (R&D) approach to develop an educational product. Specifically, the development of the PBL-based snakes and ladders media follows the procedure outlined by Borg and Gall. Primary data were collected from teachers and fifth-grade students at an elementary school in the Gugus Pattimura area, Gabus district, Grobogan regency. Secondary data were gathered from written sources, including journals and theses.

Data collection techniques included interviews, questionnaires, and documentation. The validity of the data was tested through expert evaluations and response questionnaires from teachers and students. The analysis of the collected data involved both descriptive qualitative analysis and quantitative analysis.

3. Results and Discussion

To evaluate the effectiveness of the problem-based learning (PBL) snakes and ladders media, learning outcomes before and after using the media were compared. Additionally, learning outcomes in the experimental group were compared with those in the control group to further assess the media's effectiveness. The t-test (Paired Sample T-Test) and the calculation of the gain index were used to test the effectiveness of the learning media.

Validity measures the degree to which an instrument accurately measures what it is intended to measure and reveals data from the studied variables appropriately. Based on the study results, out of 32 question items tested, 30 items were deemed valid, having r-count values greater than r-table, while 2 items (questions 16 and 29) were deemed invalid, having r-count values less than r-table. Consequently, the test comprised 30 valid questions.

The reliability of the instrument, which determines the consistency of the evaluation tool in measuring student performance, was assessed. An evaluation tool is considered reliable if it yields consistent results across different subjects and times (Russeffendi, 2015). The reliability test results indicated a coefficient value of 0.929, which is greater than 0.60, signifying that the test items are reliable and consistent. The correlation level within the reliability category is very strong.

According to Singhal et al. (2016), the difficulty level of a question is determined by the students' ability to answer it, not by the teacher's ability to create it. The difficulty level indicates how easy or difficult the test items are for students. This study ensured that the questions were appropriately challenging, reflecting the students' abilities.

Table 1: Difficulty test result of test questions

Statistics										
Item	1	2	3	4	5	6	7	8	9	10
Mean	.50	.45	.45	.60	.60	.50	.65	.55	.50	.30
Item	11	12	13	14	15	16	17	18	19	20
Mean	.65	.50	.45	.50	.45	.45	.55	.50	.65	.60
Item	21	22	23	24	25	26	27	28	29	30
Mean	.50	.45	.55	.75	.40	.50	.60	.50	.50	.50

Based on the results of the analysis above, it can be seen that 1 item (3.3%) is included in the difficult category, 28 questions (93.4%) in the medium category and 1 item (3.3%) in the easy category. The distribution of questions based on the difficulty level of the questions can be seen in the Table 2.

Table 2: Distribution of items based on difficulty level

Classification	No Question	f	%
Easy	24	1	3.3
Medium	1,2,3,4,5,6,7,8,9,11,12,13,14,15,16,17,18 19,20,21,22,23,25,26,27,28,29,30	28	93.4
Hard	10	1	3.3

The normality test is carried out to test whether all data is normally distributed or not. The normality test uses the Shapiro-Wilk test formula because the sample used is < 50. To find out whether normal is if sig > 0.05 then it is normal and if sig < 0.05 it can be said to be abnormal. Statistical results using the SPSS for Windows 24 program for normality can be seen in Table 3.

Table 3: Normality test results

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Class V social sciences learning outcomes elementary school	Pretest experiment 1	.152	25	.110	.922	25	.056
	Posttest experiment 1	.146	25	.144	.939	25	.137
	Pretest experiment 2	.153	28	.093	.930	28	.063
	Posttest experiment 2	.135	28	.116	.937	28	.090
	Pretest control	.114	28	.200	.942	28	.125
	Posttest control	.140	28	.170	.952	28	.217
a. Lilliefors significance correction							

The results of the data normality test in the table above show that the significance value is greater than 0.05 at the 5% significance level. Thus, it is concluded that the data in each class is normally distributed. This normality assumption is necessary because if normality is not met, the effectiveness test decision (t-test) obtained becomes invalid. The average similarity test was carried out to find out whether the two sample classes departed from the same average conditions or not. The results of the analysis of the similarity test on the average test scores of students' learning outcomes before learning (Pretest) using PBL-based snakes and ladders media for class V in experimental class 1, experiment 2 and control using One-Way Anova can be seen in Table 4.

Table 4: Homogeneity test results (pretest)

ANOVA Learning Outcomes of Grade V Elementary School Students					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.193	2	7.597	.111	.895
Within Groups	5316.831	78	68.165		
Total	5332.025	80			

Based on the results of the analysis of the average similarity test of student learning outcomes before being treated in the One-Way Anova table above, a significance value of 0.895 > 0.05 is obtained, so it can be concluded that the experimental class and control class have the same average value or the initial ability of students in the experimental class is balanced with the control class. After it is known that the initial abilities of the experimental and control class students are balanced, it can be concluded that the two sample classes have met the requirements to be given treatment,

namely providing learning using PBL-based snakes and ladders media class V social studies subject Theme 7: Events in Life Sub theme 1: National events during the colonial period in the experimental class, whereas in the control class learning was carried out using conventional methods. As for the balance test of students' posttest results using different learning as shows in Table 5.

Table 5: Results of learning outcomes balance test (posttest)

ANOVA Learning Outcomes of Grade V Elementary School Students					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2033.060	2	1016.530	16.046	.000
Within Groups	4941.409	78	63.351		
Total	6974.469	80			

Based on the results of the analysis of the average similarity test of student learning outcomes after learning in the experimental class and control class using One-Way Anova in the table above, the significance value of learning outcomes is 0.000 <0.05, so it can be concluded that the experimental class and control has an average learning outcomes that are not the same or unbalanced. After the prerequisite tests were met (normality, homogeneity and average similarity), then an effectiveness test was then carried out using a paired-samples t-test to find out whether the development of PBL-based snakes and ladders media in class V social studies subjects Theme 7: Events in Life Sub theme 1: National events during the colonial period were effective in improving student learning outcomes. The results of the paired-samples t test analysis can be seen in Table 6.

Table 6: Paired samples test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre_Post experiment 1	22.160	7.028	1.406	25.061	19.259	15.766	24	.000
Pre_Post experiment 2	23.357	5.832	1.102	25.619	21.096	21.191	27	.000
Pre_Post control	11.857	4.062	.768	13.432	10.282	15.447	27	.000

Based on the results of the paired samples test, it can be concluded that the experimental class 1 (SDN 1 Banjarejo) obtained a Sig. 0.000 <0.05, or Tcount 15.766 > ttable 2.06390, it can be concluded that there is a difference in the average student learning outcomes before and after learning using PBL-based snakes and ladders media. This result means that PBL-based snakes and ladders media is effective in improving the learning outcomes of fifth grade students at SDN 1 Banjarejo.

Experimental class 2 (SD N 3 Banjarejo) obtained a sig value of 0.000 <0.05, or Tcount 21.191 > Ttable 2.05183. It can be concluded that there is an average difference in student learning outcomes before and after learning using PBL-based snakes and ladders media. This result means that PBL-based snakes and ladders media is effective in improving the learning outcomes of fifth grade students at SDN 3 Banjarejo. The control class (SDN 1 Gabus) obtained a value of Sig 0.000 > 0.05, or Tcount 15.447 <ttable 2.05183. It can be concluded that there is a difference in the average student learning outcomes before and after learning is carried out.

Table 6: Recap of paired samples statistics

	Mean	N	Std. Deviation	Std. Error Mean
Post Experiment 1	84.80	25	7.439	1.488
Post Experiment 2	85.04	28	6.834	1.291
Post Control	74.39	28	9.335	1.764

The paired samples statistics, based on posttest values, reveal that the learning outcomes of students in the experimental classes, which used PBL-based snakes and ladders media, are as follows: In experimental group 1 at SD Negeri 1 Banjarejo, the average score was 84.8, and in experimental group 2 at SD Negeri 3 Banjarejo, the average score was 85.04. These results indicate that student learning outcomes in the two experimental groups are relatively similar.

However, when comparing the learning outcomes of the experimental groups with the control group, the control group scored a posttest average of 74.39. These findings suggest that students in the experimental groups, who used PBL-based snakes and ladders media, achieved better learning outcomes than those in the control group. Therefore, it can be concluded that the PBL-based snakes and ladders media for fifth-grade elementary school students is effective in improving learning outcomes. Further analysis using the gain index for the effectiveness of the PBL-based snakes and ladders media in SD Negeri 1 Banjarejo revealed the following: 10 students (40%) experienced a high increase in learning outcomes, 13 students (52%) experienced a moderate increase, and 2 students (8%) experienced a low increase. These results indicate that the majority of students in SD Negeri 1 Banjarejo experienced a moderate increase in learning outcomes using the PBL-based snakes and ladders media.

In SD Negeri 3 Banjarejo, the gain index results showed that 12 students (43%) experienced a high increase in learning outcomes, 15 students (54%) experienced a moderate increase, and 2 students (3%) experienced a low increase. This indicates that most students in SD Negeri 3 Banjarejo experienced a moderate increase in learning outcomes with the use of PBL-based snakes and ladders media. Conversely, the gain index for the control group in SD Negeri 1 Gabus showed that only 1 student (4%) experienced a high increase in learning outcomes, 8 students (29%) experienced a moderate increase, and 19 students (67%) experienced a low increase. These results suggest that, without using PBL-based snakes and ladders media, the majority of students in SD Negeri 1 Gabus experienced a low increase in learning outcomes. In summary, the PBL-based snakes and ladders media effectively improved learning outcomes for fifth-grade students, with the majority experiencing moderate to high increases in their learning performance, unlike the control group, which showed predominantly low increases.

4. Discussion

The results of the gain index test in experimental class 1 demonstrated that the PBL-based snakes and ladders media effectively improved student learning outcomes in grade V at SD 1 Banjarejo. Specifically, 10 students (40%) experienced a high increase in learning outcomes, 13 students (52%) experienced a moderate increase, and 2 students (8%) experienced a low increase. These results indicate that the majority of students in class V at SD 1 Banjarejo saw a moderate to high improvement in their learning outcomes with the use of PBL-based snakes and ladders media. Similarly, the gain index test results for SD Negeri 3 Banjarejo showed that 12 students (43%) experienced a high increase in learning outcomes, 15 students (54%) experienced a moderate increase, and 2 students (3%) experienced a low increase. This demonstrates that the majority of fifth-grade students at SD Negeri 3 Banjarejo experienced a moderate to high improvement in their social studies learning outcomes using the PBL-based snakes and ladders media.

In contrast, the gain index test for the control group at SD Negeri 1 Gabus indicated that only 1 student (4%) experienced a high increase in learning outcomes, 8 students (29%) experienced a moderate increase, and 19 students (67%) experienced a low increase. These findings suggest that without the PBL-based snakes and ladders media, the majority of students in class V at SD Negeri 1 Gabus experienced only a low increase in learning outcomes. The paired-samples t-test further confirmed the effectiveness of the PBL-based snakes and ladders media. The posttest scores for experimental group 1 averaged 84.8, for experimental group 2 averaged 85.04, while the control group had a mean score of 74.39. These results clearly indicate that the experimental groups, which used the PBL-based snakes and ladders media, achieved higher scores than the control group. Thus, it can be concluded that the PBL-based snakes and ladders media is an effective tool for improving student learning outcomes in social studies for fifth-grade elementary school students. This conclusion aligns with the opinion of Ntombela (2015), who stated that the PBL learning model contributes significantly to successful learning outcomes. The PBL model engages students in a learning process characterized by real-world problem contexts, active group learning, problem formulation, identification of knowledge gaps, and independent exploration of related materials and solutions.

5. Conclusion

Based on the background of the problem and the research findings, it can be concluded that the PBL-based snakes and ladders media is effective in improving learning outcomes for Social Studies in fifth-grade elementary school students. The paired-samples t-test results showed that the posttest scores for experimental group 1 averaged 84.8 and for experimental group 2 averaged 85.04, while the control group had a mean score of 74.39. These results indicate that the experimental groups, which used the PBL-based snakes and ladders media, achieved higher scores than the control group. Therefore, it can be concluded that the PBL-based snakes and ladders media is an effective tool for enhancing student learning outcomes in Social Studies.

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