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Improving Student Learning Outcomes through Implementation Diorama Media Based on Problem Based Learning

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ABSTRACT
This research explores the effectiveness of the implementation of Problem-Based Learning (PBL) based diorama media in improving student learning outcomes on material on agricultural products from ASEAN countries in class VI of Pasrujambe 08 State Elementary School. This Classroom Action Research (PTK) was carried out in two cycles, each each includes the stages of planning, implementing actions, observing and reflecting. The research results showed a significant increase in student learning outcomes: classical completion increased from 40% in pre-cycle to 60% in cycle I, and reached 80% in cycle II. The implementation of PBL-based dioramas has proven effective in increasing students' understanding of the types of agricultural products in ASEAN countries, as well as developing critical and collaborative thinking skills. This research makes an important contribution to the educational literature by offering practical guidance for teachers in creating more engaging and interactive learning.

INTRODUCTION

The main problem faced in efforts to improve student learning outcomes is the use of conventional and less varied teaching methods, such as being limited to worksheet books and routine assignments, which results in student inactivity in the learning process and average grades that do not reach the Minimum Completeness Criteria (KKM). One approach that can be used to overcome this problem is the implementation of Problem-Based Learning (PBL) based diorama media. The PBL method has been proven effective in improving student's conceptual understanding and critical thinking skills through active involvement in problem-solving (Hmelo-Silver, 2004; Elaine & Goh, 2016). In addition, the use of diorama media as a visual aid can make abstract concepts more concrete, helping students understand the material better (Barrows, 1996). Research by Thomas (2000) also shows that PBL can improve student learning outcomes significantly, especially in the practical application of the material studied. Thus, implementing PBL-based diorama media is expected to be an effective strategy for improving student learning outcomes through a more interactive and exciting approach.

Based on the results of researchers' searches, many studies have discussed problem-based learning. This preliminary study examines the effectiveness of Problem-Based Learning (PBL) in improving student learning outcomes at various levels of education. PBL is a student-centered learning approach, where they learn through problem-solving. Research shows that PBL assisted by audio-visual media effectively improves learning outcomes on specific themes (Jannah et al., 2020) and is very important for improving the quality of learning (Komariah, 2021). PBL also positively influences integrated thematic learning in class V (Larasati & Muhammadi, 2020) and improves learning outcomes for certain subthemes (Marwah et al., 2021). The development of animated video learning media for a specific material (Madhuri & Budiyono, 2020; Kiong, 2022) and other learning

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media (Nurrita, 2018) supports the effectiveness of PBL. The PBL model assisted by animation media increases interest and learning outcomes (Rustinah et al., 2021), while the PBL strategy improves students' reading comprehension (Syahfutra & Niah, 2019). The development of PBL-based LKPD improves scientific literacy skills (Tamam et al., 2023), and scientific literacy-based PBL improves students' critical thinking skills (Umamah et al., 2018). Thus, this new research adds a unique dimension by testing the effectiveness of PBL-based diorama media on agricultural produce from ASEAN countries, which should have been discussed in the preliminary study above.

This research offers valuable insights into how Problem-Based Learning (PBL)-based diorama media can significantly improve elementary students' learning outcomes, specifically in the context of ASEAN agricultural products. By incorporating PBL, which emphasizes real-world problem solving, the use of dioramas not only makes learning more interactive but also enhances students' ability to understand complex concepts in an engaging way. Previous research, such as that of Hmelo-Silver (2004), supports the idea that integrating interactive media with PBL increases cognitive engagement and promotes deeper learning. Furthermore, the focus on ASEAN agricultural products adds a regional and contextual dimension, allowing students to gain knowledge that is directly relevant to their surroundings, thus fostering a more meaningful learning experience. The development of critical and collaborative thinking skills, essential in modern education, is another key benefit of this approach, as highlighted (Efendi et al., 2020). However, the research also identifies challenges in implementing PBL, such as limited resources and teacher readiness (Rothman & Page, 2002; Jonassen & Hung, 2012; Lu et al., 2014). Teachers must be adequately trained, and resources must be readily available for effective PBL-based diorama implementation. The study's findings will contribute to educational practices by offering practical guidance to overcome these challenges, thereby improving not only cognitive outcomes but also the affective and psychomotor aspects of learning (Gogus, 2012).

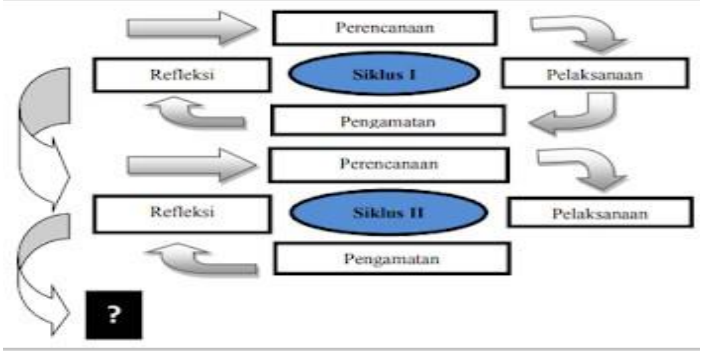
This research hypothesizes that using Problem-Based Learning (PBL) with diorama media on ASEAN agricultural products will significantly improve elementary students' learning outcomes compared to traditional methods. Dioramas provide concrete visualization of abstract concepts, enhancing understanding and making learning more engaging. The PBL approach encourages critical and collaborative thinking, helping students solve real-world problems interactively, as noted. This combination is expected to increase students' interest and deepen their comprehension of ASEAN agriculture. While interactive methods like PBL have been proven to boost cognitive and affective learning, challenges such as resource availability and teacher readiness must be addressed for successful implementation. Overall, this approach offers a practical way to improve educational quality by fostering critical thinking, engagement, and better learning outcomes.

RESEARCH METHODS

Classroom Action Research (PTK) aims to practically solve learning problems in the classroom (Slameto, 2015). The research process consists of two cycles, each including four main stages. The first stage is planning, where researchers design learning strategies, including the development of Problem-Based Learning (PBL) based diorama media for social studies learning, as well as preparing materials, preparing tools and materials, and creating a Learning Implementation Plan (RPP) (Kemmis & McTaggart, 1988). The second stage is the implementation of action, where the teacher uses PBL-based dioramas by the RPP that have been created by actively involving students in learning, material exploration, and group work (Kember, 2000). The third stage is observation, where researchers and collaborators (teachers) observe the learning process and student activities, collecting data regarding student involvement and responses to diorama media and developing their understanding of social studies material (Cohen et al., 2007). The final stage is reflection, where researchers and collaborators analyze the results of observations and evaluate the effectiveness of actions taken to identify strengths and weaknesses of learning strategies and plan improvements in the next cycle (Schon, 1983). The results of this reflection become the basis for designing actions in the second cycle.

The scope of this research includes class VI students at Pasrujambe 08 State Elementary School academic year, with the participation of 25 students. The Classroom Action Research flow diagram can be seen in the image below.

Figure 1. Classroom Action Research Cycle



Source: Arikunto et al., (2015)

The data collection method applied in this research is through conducting tests. Data analysis was carried out using qualitative and quantitative approaches. Quantitative data is obtained from the average results of evaluations and observations during the learning process.

Table1. Reference for Determining Minimum Completeness Criteria

KKM	Classical Completeness	Completed Qualifications
>70	>80%	Complete
<70	<80%	Not Completed

(Sumber: KKM Kelas VI SD Negeri Pasrujambe 08)

$$P=\frac{\sum \text{siswa yang tuntas belajar}}{\sum \text{siswa}} x100\%$$ (Aqib, 2011)

This study's evaluation of classical completeness uses five assessment categories to measure students' success. The categories are: 1) excellent, 2) good, 3) fair, 4) poor, and 5) very poor. Each category provides a clear picture of student achievement in understanding learning material. More detailed information regarding the classification of classical completeness can be found in Table 2, which presents quantitative data in detail. The table illustrates the distribution of evaluation results based on predetermined categories, providing deeper insight into the effectiveness of the learning strategies implemented.

Table 2. Classical Completeness Groups Quantitative Data

Level of success	Qualification
≥80%	Very good
60-79%	Good
40-59%	Enough
20-39%	Not enough
<20%	Very less

Based on the data in the table, the measurement of classical completeness is divided into five categories, namely: very good level (≥80%), good level (60-79%), sufficient level (40-59%), poor level (20-39%), and very low levels (<20%). The success of implementing Problem Based Learning-based Diorama Media is measured through the achievement of student learning outcomes that meet the Minimum Completeness Criteria (KKM) in social studies material with a score of ≥70, which is included in the complete category. Apart from that, success is also measured by the percentage of classical learning completeness which reaches more than 80%. Success in the skills aspect is measured by achieving a percentage of 70% in the good category. Therefore, this research concludes that the use of Diorama Media based on Problem Based Learning has succeeded in improving the learning outcomes of class VI students at SD Negeri Pasrujambe 08.

RESULTS AND DISCUSSION

Planning

Classroom Action Research was conducted in two cycles, each with two meetings. Cycle I will occur on 3 and 4 November 2023, while Cycle II will happen on 6 and 7 November 2023. Each cycle involves planning, implementing actions, observing, and reflecting. Before starting the research action, the researcher carried out a pre-cycle to evaluate the initial condition of the students before the action was carried out. Pre-cycle data was obtained from mid-semester scores with an average social studies score of 63, class score of 68, and classical completeness of 40%. The results of interviews and pre-cycle observations show low student learning outcomes, which indicates the need for action to overcome this problem. Actions taken include the application of Problem-Based Learning (PBL) based diorama media in Cycles I and II.

Implementation of Actions

In Cycle I, learning was carried out in 2 meetings by applying Problem-Based Learning (PBL) based diorama media for social studies subjects. The results in Cycle I showed an average class of 68 with a classical completeness of 60% (good category). However, because it has not reached the specified completeness (≤ 80%), improvements are needed in Cycle II. The learning implementation in Cycle II consists of 2 meetings with a time location of 2 × 35 minutes. The results of Cycle II showed an increase in the class average to 77, and classical completeness reached 80%. This shows the suitability of the research with the classical completeness requirement of 80%. The increase in student learning outcomes in Pre-Cycle, Cycle I, and II can be seen in Table 3.

Table 2. Improvement in student learning outcomes in Pre-Cycle, Cycle I and II

Cycle	Student	Classical Completeness		
		Complete	No Complete	Persentase
Pra	25	10	15	40%
Cycle I	25	15	10	60%
Cycle II	25	20	5	80%

Based on the data in the table, there has been an increase in the learning process from pre-cycle cycle I to cycle II. At the pre-cycle stage, of the 25 students, only 10 achieved completeness, while 15 students still needed to achieve completeness with a completion percentage of 40%. Therefore, improvements are required in the learning process to improve the learning outcomes of class VI students at SD Negeri Pasrujambe 08.

Observation

In cycle I, there was an increase in classical completeness, reaching 60%, which was included in the excellent category. However, the research must be continued in cycle II because the researchers set a classical completeness standard of 80%. In cycle I, of the 25 class VI students at Pasrujambe 08 State Elementary School, 15 achieved scores above the KKM, while 10 were still below the KKM. In cycle II, 20 students got scores above the KKM, while only five were below the KKM. The steps in Classroom Action Research by applying Problem-Based Learning (PBL) based diorama media in social studies learning "Agricultural Results of ASEAN Countries" involve the following process: 1) Providing problems to students, 2) Organizing students, 3) Providing guidance investigation, 4) Developing and presenting student work, and 5) Carrying out analysis and evaluation of problem-solving. The standard for student completeness set by SD Negeri Pasrujambe 08 is 70, while the standard for classical completeness in this study is ≥ 80%. The increase in student learning outcomes in applying Problem-Based Learning (PBL) based diorama media in social studies learning "Agricultural Results of ASEAN Countries" is recorded in Table 4, which includes the pre-cycle, cycle I, and cycle II stages.

Table 3. Recapitulation of Improvement in Student Learning Outcomes class VI Pasrujambe 08 State Elementary School in pre-cycle, cycle I and cycle II

No	Mark	Pre cycle	Cycle I	Cycle II
1.	Class average	63	68	77
2.	Highest	85	90	100
3.	Lowest	51	40	50
4.	Students complete	10	15	20
5.	Students do not complete	15	10	5
6.	Completed students (%)	40%	60%	80%
7.	Incomplete (%)	60%	40%	20%
8.	Criteria for Completion of Classical Learning (≥75%)	Not finished	Not finished	finished

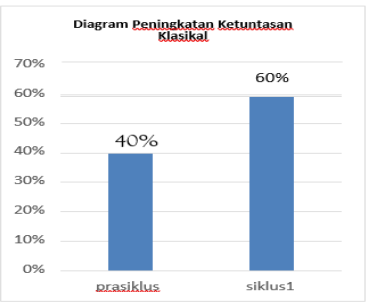
The table summarizes how implementing problem-based learning (PBL) based diorama media in social studies learning improved learning outcomes for class VI students at Pasrujambe 08 Public Elementary School.

Reflection

To improve learning, there are three activity steps. Before improvements were made, initial data (pre-cycle) showed that the average score for class VI students was 63, with the highest score being 85 and the lowest being 51. Of the 25 students, ten students completed and 15 students did not complete, resulting in a percentage of students completing at 40%, while students who did not complete reached 60%. This condition does not meet the classical completeness criteria of ≥ 80%. Therefore, learning improvements were carried out through two research cycles. In Cycle I, the class average reached 68, with the highest score being 90 and the lowest score being 40. Fifteen students completed (above the KKM), and 10 students did not complete (below the KKM), so the percentage of students who completed was 60%, and students who did not complete were 40%. Even though the results are promising, improvements are still needed in Cycle II. In Cycle II, the class average increased to 77, with the highest score being 100 and the lowest score being 50. A total of 20 students completed it, while five did not. In percentage terms, students who completed it reached 80%, while students who did not complete it reached 20%, which is included in the outstanding category. Because they have reached the specified classical learning completeness (≥80%), the cycle activities are stopped.

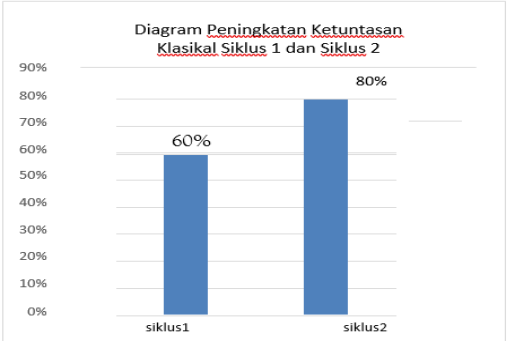
The data demonstrates a clear progression in student performance through the implementation of targeted learning improvements over two cycles. The initial data highlighted significant challenges, with a low average score and completion rate. Cycle I showed moderate improvement, but the substantial gains in Cycle II underscore the effectiveness of the continued interventions. Meeting the classical completeness criteria in Cycle II validates the strategies employed and suggests that the learning activities were appropriately adjusted to address the students' needs.

Figure 2 presents the Pre-cycle and Cycle Classical Completeness Improvement Diagram I



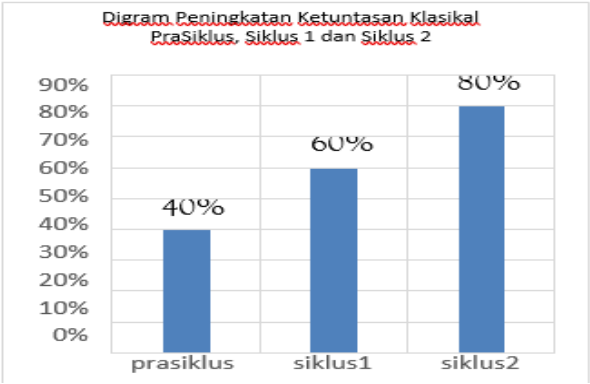
The diagram shows an increase in classical completion levels from Cycle I to Cycle II. In Cycle I, the completion rate was 60%, which increased to 80% in Cycle II. Initially, only 40% of students met the minimum passing criteria, highlighting ineffective initial teaching methods. Despite improvements in Cycle I (average score of 68 and a completion rate of 60%), a significant score gap persisted. In Cycle II, the average score rose to 77, and the completion rate reached 80%, with the highest score at 100 and the lowest at 50. This improvement suggests effective post-Cycle I adjustments, but 20% of students still did not meet the criteria, indicating issues such as individual learning difficulties and lack of engagement. Future strategies should include formative assessments and personalized support to address these gaps. While the data shows clear progression, addressing lower-performing students' needs remains crucial for achieving equitable learning outcomes.

Figure 3: Improvement in learning outcomes for class VI students in cycle I and cycle II



The diagram illustrates an increase in the level of classical completion in each cycle, namely cycle I and cycle II. In cycle I, a classical completion level of 60% was achieved, while in cycle II, there was an increase with an achievement of 80%.

Figure 4. Presents the improvement in learning outcomes in pre-cycle, cycle I, and cycle II activities



Based on this picture, the social studies learning process has increased from pre-cycle activities to cycle II. In the pre-cycle, the classical completeness level reached 40%, so improvement efforts were needed in cycle I. The classical completeness level in cycle I increased to 60% (good category). However, cycle II still needs learning improvements because the classical completeness target set is 80%. Therefore, a classical completion level of 80% was achieved in cycle II.

Discussion

Several significant results were obtained based on the research findings regarding the application of Problem-Based Learning (PBL) based diorama media on agricultural products from ASEAN countries to improve the learning achievement of grade VI elementary school students.

Increasing Learning Achievement Through PBL Assessed Using Written Exams

The exploration of Problem-Based Learning (PBL) as a method to improve learning achievement offers compelling insights into its effectiveness, especially in comparison to traditional Lecture-Based Learning (LBL). Zheng et al.'s (2023) meta-analysis underscores a nuanced

understanding of PBL's impact. While PBL may not significantly increase theoretical understanding compared to LBL, its strengths lie in developing clinical competency and enhancing problem-solving abilities. This finding is crucial, particularly in fields like medical education, where analytical skills and clinical application are paramount. However, the question arises whether the same results would be observed in other disciplines, where theoretical knowledge might be prioritized over practical application. The limited impact on theoretical understanding could be a concern in more knowledge-based fields, raising the issue of whether PBL needs to be supplemented with more structured content delivery for certain subjects (Susilo et al., 2023; Baran & AlZoubi, 2023).

Furthermore, the improvement in clinical competence associated with PBL (Zheng et al., 2023; Tan et al., 2023) suggests that the hands-on, collaborative nature of PBL better prepares students for real-world scenarios. This aligns with the broader educational shift toward experiential learning, where practical skills are increasingly valued. However, there remains a potential challenge in assessing PBL's effectiveness across various contexts. The demands of PBL, such as smaller class sizes and more resources, might limit its scalability in larger, resource-constrained institutions. Thus, while the advantages are clear in specialized, high-investment areas like medical education, it's important to question whether PBL can be equally effective in larger or more diverse educational settings without adjustments to its implementation.

In terms of student satisfaction, Brown et al. (2023) highlight that PBL promotes greater satisfaction due to increased collaboration, motivation, and interaction. While this is a notable advantage, the increase in satisfaction does not always directly translate to better academic outcomes. While collaboration and motivation are essential for deeper engagement, there is also the risk that some students may struggle with the self-directed nature of PBL, particularly if they lack foundational skills or intrinsic motivation. This poses the critical question of how PBL can be effectively balanced with direct instruction to ensure all students benefit equally from the approach. While the collaborative nature of PBL fosters a more dynamic learning environment, the extent to which it supports or challenges students with different learning styles and abilities should be carefully considered..

The study by Smith et al. (2023) highlights the potential of Problem-Based Learning (PBL) to contribute positively to educational equality by narrowing achievement gaps, especially among students from various socioeconomic backgrounds. This is particularly important as students from low-income families, often disadvantaged in traditional learning environments, tend to experience significant gains when engaged with PBL. By connecting academic concepts to real-life experiences, PBL fosters higher engagement and interest, as shown by Smith et al. (2023). This finding underscores the inclusivity of PBL, as it offers a more equitable learning environment for students of diverse backgrounds. However, critics argue that PBL heavily depends on students' independent learning skills, which may pose challenges for those with weaker foundational knowledge. Johnson (2023) suggests that a hybrid approach combining PBL with direct teacher instruction could address this concern. By integrating guided learning with independent problem-solving, students who struggle with self-directed learning can still benefit from the method, thereby maximizing its effectiveness (Tong et al., 2022; Harini et al., 2023; Dahal & Bhat, 2023).

The criticism points to a need for structured teacher involvement, particularly in the early stages of student learning, to ensure that all students—regardless of their skill levels—can navigate PBL successfully. This aligns with the idea that while PBL is highly beneficial in developing analytical and problem-solving skills, its success depends on proper implementation, sufficient teacher support, and adaptation to individual student needs. In conclusion, while PBL is an effective strategy for promoting both academic achievement and engagement, it is most successful when combined with teacher-led instruction, offering students a balance between guidance and independent learning opportunities (Keiler, 2018; Almulla, 2020; Markula & Aksela, 2022). Thus, the challenge lies in providing adequate support, particularly for students with less experience, to ensure all learners benefit fully from the PBL approach.

Evaluation of Increasing Student Learning Achievement Through PBL-Based Diorama Media

Using Problem-Based Learning (PBL)-based diorama media has proven to be an effective strategy for enhancing student learning outcomes. Research by Jensen et al. (2023) demonstrates that dioramas help increase student focus and engagement by offering concrete visual representations of abstract concepts. This method enables students to better understand the material and fosters a greater interest in learning. The ability to interact with tangible models makes the learning experience more immersive and meaningful, leading to improved retention and comprehension of the subject matter. In addition, Brown and Lee (2023) found that diorama media can significantly boost students' learning motivation. By providing an interactive and visually stimulating environment, dioramas reduce feelings of boredom and increase engagement with the material being taught. Observations revealed that students became more enthusiastic and motivated when they could manipulate objects related to the lesson, making the learning process more dynamic and participatory (Pozzi et al., 2014; Yan et al., 2023).

These findings suggest that combining PBL with diorama media not only deepens students' understanding but also enhances their motivation to learn. The interactive nature of dioramas provides a multi-sensory experience that helps maintain student interest, particularly when dealing with challenging or abstract topics. Furthermore, this approach supports the development of critical thinking and problem-solving skills, key competencies in modern education. Overall, the integration of PBL-based diorama media represents a powerful tool in creating a more engaging, effective, and student-centered learning environment (Johannesson et al., 2013; Sawyer, 2014; Mashud et al., 2023).

The research by Smith et al. (2023) highlights the transformative impact that Problem-Based Learning (PBL) with dioramas can have on student behavior in the classroom, particularly in terms of increasing focus and engagement. This finding is important as it addresses one of the major challenges in education—maintaining student interest and reducing negative behaviors, such as disengagement or distraction. By offering a tangible, interactive medium like dioramas, students can better connect with abstract concepts, making the learning process more enjoyable and meaningful. However, while these results are promising, they also raise critical questions regarding the sustainability of such behavior changes. Are these positive behavioral shifts maintained over time, or are they dependent on the novelty of the diorama medium? Longitudinal studies would be needed to assess the durability of these improvements. Furthermore, Johnson's (2023) findings on the improvement of students' conceptual understanding and analytical abilities through PBL with dioramas suggest that visual aids play a crucial role in supporting deeper learning. The visual and hands-on nature of dioramas reinforces PBL's emphasis on contextual and collaborative learning, which is more likely to result in lasting cognitive gains compared to passive learning methods. However, one critical concern is the extent to which this approach is scalable. Implementing diorama-based PBL requires resources, such as time for preparation, materials, and teacher training. In underfunded or resource-limited schools, replicating this model might be challenging, limiting its accessibility (Carreon et al., 2023; Cole et al., 2023).

Additionally, the findings by Ghani et al., (2021) and Bilgin et al., (2015) affirm that PBL-based dioramas not only improve academic achievement, as seen through written exam results, but also enhance students' motivation and positive behavior. While this suggests a dual benefit of cognitive and behavioral improvements, it is worth questioning whether all students benefit equally from this approach. For students with learning disabilities or those who struggle with self-directed learning, PBL might pose additional challenges. Thus, while dioramas offer valuable benefits in promoting engagement and understanding, their implementation should be carefully adapted to meet the diverse needs of students (Ning & Inan, 2023). In conclusion, while PBL-based dioramas demonstrate significant potential for improving both academic and behavioral outcomes, critical factors such as long-term sustainability, scalability, and adaptability to diverse learners should be addressed to maximize its effectiveness in varied educational settings.

CONCLUSIONS

Research at Pasrujambe 08 State Elementary School shows that using Problem-Based Learning (PBL) dioramas improves social studies learning achievement. In the pre-cycle, students' learning completeness was only 40%, but this increased to 60% in cycle I and 80% in cycle II. Using dioramas makes students more interested, motivated, and active in learning and helps them understand the material and solve problems more effectively. The PBL strategy with dioramas has proven effective in improving student learning outcomes.

This research carries significant implications for the field of education. It provides theoretical support for constructivist learning theory and learning motivation by demonstrating that learning through diorama media can enhance students' understanding and motivation. The practical implications are far-reaching, including the integration of PBL-based dioramas into school curricula, teacher training in their use, development of visual learning resources, and most importantly, ongoing evaluation to gauge the effectiveness of this strategy. By continually assessing and refining the use of PBL-based dioramas, we can ensure that the learning process remains engaging, meaningful, and significantly improves student learning outcomes.

Further research is recommended to explore the application of PBL-based dioramas in various other subjects, such as science and mathematics, as well as at different levels of education, to assess the consistency of their effects. Additionally, research can compare the effectiveness of other visual media in PBL, such as videos and infographics. Identifying success factors such as teacher training, infrastructure support, and parent participation is also essential. This further research can help find learning strategies that are more effective and can be implemented widely to improve the quality of education.

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