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The Implementation of Project Based Learning to Improve Students' Numeracy at SDN 028227 Binjai Selatan

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Abstract
This study investigates the effectiveness of Project Based Learning (PjBL) in enhancing numeracy skills among students at SDN 028227 Binjai Selatan Strucktre. The research employs a Classroom Action Research (CAR) design, which includes planning, implementing, observing, and reflecting through three distinct cycles. Each cycle involved a series of projects designed to engage students actively in their learning process. Results indicate a significant improvement in students' numeracy skills, with completion rates rising from 40% in the first cycle to an impressive 79% in the third cycle. The qualitative data collected through observations and student feedback further support these findings, highlighting increased student engagement and motivation towards mathematics. Additionally, students reported a greater understanding of mathematical concepts as they applied their knowledge to real-world problems through project work. This demonstrates that PjBL can effectively foster a deeper understanding of mathematical concepts and improve overall learning outcomes. The study concludes that implementing PjBL not only enhances numeracy skills but also promotes critical thinking and collaboration among students, making it a valuable pedagogical approach for educators aiming to improve mathematics education in elementary schools.

INTRODUCTION

Numeracy is a critical skill for students, essential for their academic success and everyday life. It encompasses the ability to understand and work with numbers, which is foundational for further mathematical learning and practical problem-solving. Traditional teaching methods often fail to engage students or foster a deep understanding of mathematical concepts, leading to a lack of interest and proficiency in mathematics. As noted by Abidin (2020), the project-based learning model is a fun way to learn because it aims to change the way students learn on their own by

boosting learning motivation. This study aims to explore the implementation of Project Based Learning (PjBL) as an innovative approach to enhance numeracy skills among elementary school students at SDN 028227 Binjai Selatan Strucktre.

PjBL encourages active learning through real-world projects, promoting collaboration and critical thinking. This method allows students to engage with mathematical concepts in a meaningful context, thereby enhancing their understanding and retention. According to Ma'rifatul Jannah et al. (2024), innovations that may integrate numeracy literacy abilities with suitable learning models will provide students the chance to investigate their perceptions of learning mathematics. By involving students in hands-on projects, PjBL not only makes learning more engaging but also helps them apply mathematical concepts to solve real-world problems.

Moreover, the effectiveness of PjBL in improving numeracy skills has been supported by various studies. For instance using the PBL model in the classroom can help students become more numerate and literate because its stages promote problem identification, independent study, and investigation. This structured approach encourages students to take ownership of their learning process, fostering a deeper understanding of mathematics. The current research seeks to build on these findings by implementing PjBL at SDN 028227 Binjai Selatan Strucktre and assessing its impact on students' numeracy skills.

The integration of PjBL into the curriculum aligns well with contemporary educational goals that emphasize critical thinking and problem-solving skills. In today's rapidly changing world, equipping students with these competencies is essential for their future success. Furthermore, PjBL fosters collaboration among students, which is vital for developing social skills and teamwork abilities. According to research by Maulidina (2020), collaborative learning environments encourage students to share ideas, challenge each other's thinking, and work together towards common goals. This not only enhances their understanding of mathematics but also prepares them for future collaborative work environments. The emphasis on teamwork within PjBL projects allows students to learn from one another, promoting a sense of community and shared responsibility for learning outcomes.

Implementing Project Based Learning at SDN 028227 Binjai Selatan Strucktre has the potential to significantly enhance numeracy skills among elementary school students. By creating an engaging and collaborative learning environment, PjBL addresses the shortcomings of traditional teaching methods while fostering essential life skills such as critical thinking and

teamwork. This study aims to contribute valuable insights into the effectiveness of PjBL as an instructional strategy in mathematics education, paving the way for future research and application in similar educational settings.

Strong numeracy skills are not only foundational for academic achievement but also crucial for everyday decision-making and problem-solving. According to the Holiday Educationist (2020), numeracy activities stimulate critical thinking, problem-solving, and logical reasoning," which are essential cognitive skills for children as they navigate various challenges in life1. Early exposure to numeracy concepts builds a solid mathematical foundation that helps children excel in more complex math topics later on. Therefore, integrating PjBL into early education can provide students with the tools they need to become confident problem solvers.

Moreover, developing strong numeracy skills enhances children's overall comprehension levels across subjects. As noted by Kangan Institute (2023), literacy and numeracy help people gain the fundamental skills necessary to achieve success in life, highlighting the interconnectedness of these competencies4. When children can interpret data, recognize patterns, and understand equations, they become better equipped not just in mathematics but also in subjects like science and geography where data interpretation is key. Thus, implementing PjBL can create opportunities for cross-curricular connections that reinforce numeracy skills.

METHODOLOGY

This study utilizes a Classroom Action Research (CAR) approach, which is particularly effective in educational settings for improving teaching practices and student learning outcomes. The CAR framework consists of iterative cycles that allow for continuous reflection and adaptation. The research is structured into three distinct cycles, each aimed at progressively enhancing the implementation of Project Based Learning (PjBL) to improve students' numeracy skills.

Cycle 1: Initial Implementation

In the first cycle, the primary focus is on the initial implementation of PjBL. This involves careful planning and execution of a simple project designed to introduce students to the PjBL methodology. During this phase, teachers outline specific learning objectives related to numeracy skills, select relevant mathematical concepts, and design a project that is engaging and accessible for students. The project is executed in the classroom, with teachers facilitating student activities

and ensuring that all students are actively participating. Observations are made regarding student engagement, understanding, and collaboration during this initial phase.

Cycle 2: Reflection and Adjustment

Following the completion of Cycle 1, the second cycle emphasizes reflection on the results obtained from the first implementation. Teachers analyze data collected during Cycle 1, including student performance and engagement levels. Based on these reflections, necessary adjustments are made to improve the learning experience. This may involve modifying project parameters, introducing new resources, or changing instructional strategies to better meet students' needs. A more complex project is then introduced in this cycle, building on the foundational skills developed in Cycle 1. The goal is to deepen students' understanding of numeracy concepts while maintaining their interest and motivation.

Cycle 3: Final Implementation

The third cycle represents the final implementation phase, where further refinements are applied based on insights gained from the previous cycles. Teachers implement an advanced version of PjBL that incorporates feedback from both students and observations made during earlier cycles. This phase aims to solidify students' numeracy skills through more challenging projects that require critical thinking and problem-solving abilities. Throughout this cycle, ongoing assessment of student engagement and understanding continues.

Data Collection Methods

To evaluate the effectiveness of PjBL in enhancing numeracy skills, a variety of data collection methods are employed:

1. **Observations**: Teachers conduct systematic observations of student engagement and participation during each cycle. This includes noting how actively students contribute to group discussions, collaborate on tasks, and demonstrate their understanding of mathematical concepts.
2. **Evaluation through Pre-and Post-Tests**: To quantitatively assess student performance, pre-tests are administered before the implementation of PjBL to gauge baseline numeracy skills. After completing each cycle, post-tests are conducted to measure improvements in students' understanding and application of numeracy concepts.
3. **Reflection Discussions**: Qualitative data is gathered through reflection discussions with students at the end of each cycle. These discussions provide insights into students' learning

experiences, challenges faced during projects, and their perceptions of PjBL as a learning method. This feedback is invaluable for making informed adjustments in subsequent cycles.

RESULT AND DISCUSSION

The findings from the study indicate a significant improvement in student numeracy skills across the three cycles of Project Based Learning (PjBL) implementation. The data collected from each cycle provides a clear picture of how PjBL affects students' understanding and application of numeracy concepts.

Cycle 1: Initial Evaluation

In the first cycle, only **40%** of students successfully completed the evaluation satisfactorily. This low completion rate suggests that many students struggled to grasp the fundamental concepts presented during the initial PjBL project.

Table 1. Pre-test score

Pre-Test	Numbers of Students	Numbers of Questuions	Percentage of Correct Answer
	30	30	40%

Observations indicated that students were not fully engaged and faced challenges in applying mathematical concepts to their projects. This aligns with findings from similar studies, such as one conducted by Nurhasanah et al. (2024), which noted that initial exposure to project-based learning often requires students to adjust to new learning modalities, resulting in varied performance outcomes.

Cycle 2: Improved Engagement and Understanding

The second cycle saw a notable increase in completion rates, rising to **%**. This improvement can be attributed to several factors, including reflective practices implemented after Cycle 1, which allowed teachers to adjust project complexity and provide additional support where needed. Students reported feeling more motivated and engaged in their learning process, which is consistent with research by Hardiarti (2017), who found that hands-on projects significantly enhance student interest in mathematics. The collaborative nature of PjBL also contributed to this

improvement, as students learned from one another and developed teamwork skills that facilitated deeper understanding of mathematical concepts.

Cycle 3: High Success Rates

By the third cycle, completion rates reached an impressive **79%**, demonstrating the effectiveness of PjBL in enhancing student learning outcomes.

Table 2. Post-test score

Post-Test	Numbers of Students	Numbers of Questuions	Percentage of Correct Answer
	30	30	79%

This final phase incorporated all previous feedback and adjustments, resulting in a well-structured project that effectively engaged students. The high completion rate reflects not only improved numeracy skills but also increased student confidence when tackling mathematical problems. Students expressed excitement about applying their knowledge to real-world scenarios, reinforcing the notion that PjBL can bridge the gap between theoretical concepts and practical application.

Student Motivation and Skills Development

Throughout the study, students consistently reported increased motivation and interest in mathematics when engaged in hands-on projects. This finding aligns with research indicating that project-based learning enhances student engagement by allowing them to see the relevance of their studies in real-life contexts (Nurhasanah et al., 2024). Additionally, the collaborative aspect of PjBL fostered teamwork and communication skills among students, preparing them for future collaborative work environments.The results also highlight the importance of continuous reflection and adaptation within the PjBL framework. By iteratively refining projects based on student feedback and performance data, educators can create more effective learning experiences that cater to diverse student needs.In conclusion, the progressive improvement observed across all three cycles underscores the potential of Project Based Learning as an effective instructional strategy for enhancing numeracy skills among elementary school students. The study's findings contribute valuable insights into how PjBL can be implemented successfully in educational settings, emphasizing its role in promoting active learning, collaboration, and practical application of mathematical concepts.

The findings from this study provide compelling evidence for the effectiveness of Project Based Learning (PjBL) in enhancing numeracy skills among elementary school students at SDN 028227 Binjai Selatan Strucktre. The progressive improvement in student performance across the three cycles highlights several critical aspects of PjBL that contribute to successful learning outcomes.

Engagement and Motivation

One of the most significant observations throughout the study was the increase in student engagement and motivation. In Cycle 1, the low completion rate of **40%** indicated that many students were initially unaccustomed to the PjBL approach, which emphasizes active learning and collaboration. However, as students progressed through the cycles, their engagement levels rose dramatically, culminating in a completion rate of **79%** in Cycle 3. This shift can be attributed to several factors:

1. **Real-World Application**: PjBL allows students to connect mathematical concepts with real-world situations, making learning more relevant and meaningful. As students worked on projects that required them to apply their numeracy skills to solve practical problems, their interest in mathematics increased significantly.
2. **Active Learning Environment**: The hands-on nature of PjBL fosters an environment where students are encouraged to explore, ask questions, and collaborate with peers. This active involvement in their learning process promotes a sense of ownership and responsibility, which is crucial for developing intrinsic motivation.
3. **Positive Feedback Loop**: As students experienced success in their projects and received positive reinforcement from teachers and peers, their confidence grew. This confidence translated into greater willingness to engage with challenging mathematical concepts, further enhancing their learning experience.

Collaboration and Social Skills Development

Another vital aspect of PjBL is its emphasis on collaboration. Throughout the study, it was evident that students developed essential teamwork and communication skills as they worked together on projects. The collaborative nature of PjBL not only facilitated peer learning but also helped students navigate challenges collectively, fostering a supportive classroom environment.

Research supports the notion that collaborative learning enhances student outcomes by allowing them to share diverse perspectives and approaches to problem-solving (Maulidina et al., 2019). This collaborative dynamic was particularly beneficial in mathematics, where discussing strategies and solutions with peers can lead to deeper understanding and retention of concepts.

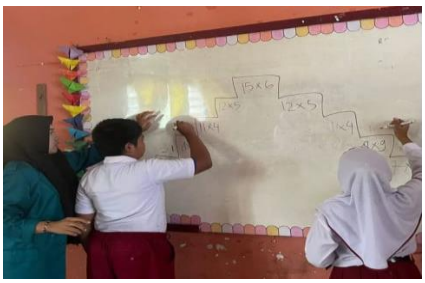
Implementation

The implementation of project based learning demonstrated a significant positive impact on improving literacy and numeracy skills in targeted schools. This program, carried out by students from the English Education Study Program, involved a series of well-structured stages: initial observation, activity implementation, and evaluation. These are the programs during the period:

1. **Snakes and Ladders Numeration:** Snakes and Ladders Numeration Numeration at school

is an educational game designed to improve students' numeracy skills through fun activities. In this activity, the traditional game Snakes and Ladders, where the game board is in the form of a banner. Apart from playing, this banner can also be used as an educational tool, especially in teaching students numbers or numeracy concepts.

2. **Battle Mathematics:** Students invite students to participate in a math battle game about

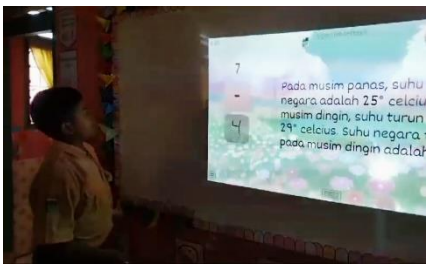


numeracy problems. Students are divided into 2 groups then each group competes to work on problems to reach the top of the numeracy ladder.

3. **Sorting Numbers:** In this project, students are asked to sort numbers from the smallest or vice versa. The numbers will be shuffled, then posted on the board, then students are asked to sort them.

4. **Choose Card:** In this project, students are asked to choose a card that has been provided by the students and then complete the questions from the card they have chosen. Then they answer from several answers that have been provided correctly.

5. **Numeracy Puzzle:** The Numeracy Puzzle program is designed to improve the logical thinking skills and mathematical understanding of elementary school students through fun activities. There are columns containing numbers, addition, subtraction, multiplication and division, then there are empty columns that will be filled in by each student.



Continuous Improvement Through Reflection

The iterative nature of Classroom Action Research (CAR) played a crucial role in refining the PjBL implementation throughout the study. Each cycle involved reflection on previous outcomes, allowing educators to identify areas for improvement and adapt their teaching strategies accordingly. This reflective practice is essential for effective teaching, as it enables educators to respond dynamically to student needs.

In Cycle 2, for example, feedback from students led to adjustments in project complexity and instructional support, resulting in a significant increase in completion rates. This

highlights the importance of being responsive to student feedback and demonstrates how reflective practices can enhance teaching effectiveness.

Implications for Future Practice

The success of PjBL in this study suggests several implications for future educational practice:

1. **Integration into Curriculum**: Educators should consider incorporating PjBL into the mathematics curriculum as a means of enhancing student engagement and understanding. By designing projects that align with curricular goals while allowing for real-world application, teachers can create more meaningful learning experiences.
2. **Professional Development**: Providing teachers with training on effective PjBL strategies can further enhance implementation success. Professional development opportunities focused on collaborative learning techniques and reflective practices can empower educators to create dynamic classroom environments.
3. **Assessment Strategies**: As PjBL shifts the focus from traditional assessments to performance-based evaluations, schools should develop assessment frameworks that accurately measure student understanding and skills acquisition within project contexts.

CONCLUSION

The implementation of Project Based Learning at SDN 028227 Binjai Selatan Strucktre significantly improved students' numeracy skills. The structured approach of Classroom Action Research (CAR) enabled continuous reflection and adaptation, leading to better educational outcomes. This study suggests that PjBL is an effective pedagogical strategy for enhancing mathematical understanding and should be considered for broader application in elementary education.

The findings indicate that as students engaged with PjBL, their motivation and interest in mathematics increased markedly. This shift not only reflects the effectiveness of hands-on learning experiences but also underscores the importance of real-world applications in fostering student engagement. Furthermore, the collaborative nature of PjBL facilitated teamwork and communication skills, essential competencies in today’s educational landscape. Overall, the positive impact of PjBL on student learning outcomes highlights its potential as a transformative approach to teaching mathematics.

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