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Analysis of the Impact of PBL Implementation Assisted by Pouch of Unit on the Ability to Count Units of Weight in Elementary School Learners

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Abstract
This study aims to analyze the impact of applying the Problem-Based Learning model assisted by a pouch of unit media on improving the ability to count units of weight in grade V elementary school students. A qualitative approach was applied through a case study method to explore students' learning experiences in problem-based learning facilitated with a pouch of unit media. Data were collected through classroom observations, interviews, and questionnaires with 25 students as respondents. Classroom observations focused on student and teacher activities in learning, while interviews explored student perceptions of learning. Questionnaire data was analyzed qualitatively to dig deeper into students' responses. Data triangulation was conducted to increase the validity and reliability of the findings. The implementation of this innovative learning model not only increased learners' engagement but also had a positive impact on their understanding of the subject matter. Learners showed increased confidence in expressing their ideas and the ability to relate the subject matter to everyday life. The use of a pouch of unit media not only strengthens focus but also increases learners' motivation to learn. In conclusion, the application of PBL assisted by a pouch of unit media is effective in improving learners' unit weight calculation skills, as well as helping them understand the unit weight concept concretely through direct manipulation. These findings indicate the need for further development in the application of innovative learning media to improve student learning outcomes.
Keywords: PBL, pouch of unit, counting, unit weight, elementary school

Abstrak
Penelitian ini bertujuan untuk menganalisis dampak penerapan model Pembelajaran Berbasis Masalah berbantuan media kantong satuan terhadap peningkatan kemampuan berhitung satuan berat pada siswa kelas V SD. Pendekatan kualitatif diterapkan melalui metode studi kasus untuk mengeksplorasi pengalaman belajar siswa dalam pembelajaran berbasis masalah yang difasilitasi dengan media kantong satuan. Data dikumpulkan melalui observasi kelas, wawancara, dan kuesioner dengan 25 siswa sebagai responden, Observasi kelas difokuskan pada aktivitas siswa dan guru dalam pembelajaran, sedangkan wawancara menggali persepsi siswa terhadap pembelajaran. Data kuesioner dianalisis secara kualitatif untuk menggali lebih dalam tanggapan siswa. Triangulasi data dilakukan untuk meningkatkan validitas dan reliabilitas temuan.. Penerapan model pembelajaran inovatif ini tidak hanya meningkatkan keterlibatan peserta didik, tetapi juga memberikan dampak positif pada pemahaman mereka terhadap materi pelajaran. Peserta didik menunjukkan peningkatan kepercayaan diri dalam mengekspresikan ide-ide mereka dan kemampuan untuk menghubungkan materi pelajaran dengan kehidupan sehari-hari. Penggunaan media kantong unit tidak hanya memperkuat fokus tetapi juga meningkatkan motivasi peserta didik untuk belajar. Kesimpulannya, penerapan PBL berbantuan media kantong satuan efektif meningkatkan kemampuan perhitungan berat satuan peserta didik, serta membantu mereka memahami konsep berat satuan secara konkret melalui manipulasi langsung. Temuan ini menunjukkan perlunya pengembangan lebih lanjut dalam penerapan media pembelajaran yang inovatif untuk meningkatkan hasil belajar siswa.
Kata Kunci : PBL, kantong satuan, berhitung, satuan berat, Sekolah Dasar

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INTRODUCTION

Education is one of the important aspects in the development of quality human resources. In the context of basic education, numeracy skills are one of the competencies needed to prepare students to face future challenges. Based on the results of the Program for International Student Assessment (PISA) in 2022, the numeracy (mathematics) performance of Indonesian students has decreased compared to 2018. In 2022, the average math score of Indonesian students was 366, down 13 points from 379 in 2018. However, Indonesia's ranking in math literacy improved by 5 positions compared to PISA 2018. Overall, the average international math score in PISA 2022 is 472. With a score of 366, Indonesia falls below this average. Only 18% of Indonesian students achieved at least Level 2 in math, while the OECD average is 69%. Level 2 is considered the minimum level of competence expected of 15-year-old students. This drop in scores shows Indonesia's education system's challenges in improving students' numeracy skills. The results show that many students in Indonesia cannot understand basic mathematical concepts well, which has implications for their ability to calculate and apply various units, including weight units (PISA, 2022).

In response to this condition, the Ministry of Education, Culture, Research, and Technology (MoECristek) issued policy No. 0340 of 2022, which encourages the implementation of innovative project-based and problem-based learning models in Indonesian schools. The Problem-Based Learning (PBL) model is one of the approaches that is considered effective to train students' critical thinking, collaboration and problem-solving skills. The application of PBL supported by concrete learning media, such as pouch of units, is expected to help students understand the concept of unit weight better. With direct manipulation through the pouch of unit media, students are not only able to understand abstract concepts in real terms but are also encouraged to be more active and involved in the learning process. This policy is in line with the need to improve the learning outcomes of Indonesian students to achieve global education standards. PBL is a learning method that places students in real situations to solve problems, thus encouraging them to think critically and creatively (Barrows, 1996). In this context, the use of learning media such as pouch of units can be an effective tool to help students understand the concept of units of weight.

Problem-Based Learning (PBL) has been proven effective in improving students' critical thinking and problem-solving skills. A study by Savery (2015) showed that students who learned through PBL showed significant improvement in problem-solving ability compared to traditional methods. PBL not only improves concept understanding but also helps students to be more involved in the learning process. For example, in an elementary school in Jakarta, the application of PBL in math learning increased student participation by 40% compared to conventional methods (Dewi, 2021).

Further research supports these findings. A meta-analysis by Wijnia et al. (2024) found that PBL, Project-Based Learning (PjBL), and Case-Based Learning (CBL) had a significant positive effect on learners' motivation, with greater improvements in learners' beliefs, values, and attitudes compared to their reasons for learning.

In addition, research by Mohamed Zin (2023) emphasized the importance of adapting PBL models oriented toward the development of critical thinking skills. The study identified that the integration of activities focused on developing critical thinking skills in PBL can increase its effectiveness in improving these skills in learners.

The implementation of PBL has also been shown to improve students' problem-solving skills and ability to write scientific articles. Research by Sari et al. (2020) showed that the PBL model had a positive effect on students' problem-solving skills and ability to write scientific articles, as well as the interaction between the two

The application of innovative learning media is also key in increasing the effectiveness of Problem-based Learning. One of the media that can be used is the pouch of unit, a visual aid designed to assist learners in understanding and manipulating abstract concepts, such as units of weight. This opinion is in line with Arends' (2012) view, which states that the use of concrete learning media can facilitate learners' understanding of abstract material, thereby increasing motivation and learning outcomes.

Pouch of units as visual aids can help students understand the concept of weight units. By using pouch of units, students can make measurements directly and see the difference between various units of weight. This is in line with research conducted by Meyer (2016), which shows that the use of concrete teaching aids can improve students' understanding of abstract concepts. In this context, this study aims to explore how the use of pouch of units in PBL can improve the ability to count units of weight in primary school students.

The study by Abdullah and Ismail (2020) found that the application of PBL with concrete media improved the understanding of mathematical concepts in elementary school students. Similarly, a study by Ahmad and Nasir (2019) showed that the use of concrete media in PBL improved problem-solving skills and understanding of mathematical concepts in learners. These two studies support the effectiveness of concrete media, such as pouch of units, in improving the understanding of abstract concepts through PBL.

Thus, the integration of concrete learning media in PBL not only facilitates the understanding of abstract concepts but also improves students' motivation and learning outcomes. The use of pouch of units as a visual aid in PBL is expected to improve the ability to count units of weight in elementary school students.

In this context, this study aims to analyze the impact of implementing Problem-Based Learning with the help of pouch of units on the ability to count units of weight in phase B primary school students. A qualitative approach through a case study method was chosen to explore the learners' learning experience in understanding the conversion of units of weight through problem-based learning. The results of the study are expected to contribute to the development of innovative learning strategies that are more effective at the elementary school level.

Related research shows that the application of Problem-Based Learning can improve mathematical concept understanding and numeracy skills. For example, in a study by Savery (2015), it was found that Problem-based Learning significantly improved learners' problem-solving ability and understanding of complex mathematical concepts. This is also supported by the findings of Schmidt et al. (2019) which showed that students who learn using Problem-based Learning have a better understanding and can apply concepts more broadly.

Based on initial observations in the field, many students still have difficulties in understanding the concept of weight units, as well as how to calculate them. This is a major concern because the ability to calculate weight units is very important in everyday life, such as when calculating the weight of objects and body weight. This research aims to identify and analyze students' learning experience in problem-based learning facilitated by a pouch of unit media.

This research hopes to provide deeper insights into how PBL and the use of pouches of units can contribute to improving students' numeracy skills, especially in understanding weight units. The results of the study are expected to be a reference for educators in developing more innovative and effective learning methods at the elementary school level. Thus, the research conducted on phase B students of SDN 2 Jendi seeks to add further

evidence regarding the effectiveness of Problem-based Learning supported by innovative learning media such as pouch of units in improving students' numeracy skills.

METHODS

This research method uses a qualitative approach with a case study method. This approach was chosen to explore the impact of applying the Problem-Based Learning model assisted by Pouch of Unit on improving the ability to count units of weight in elementary school students. Creswell, J. W. (2014) emphasizes the importance of a qualitative approach to understanding the meaning constructed by individuals (Creswell, J.W 2014). The case study was chosen because it allows researchers to explore the learning experience of students in depth and the impact of using learning media concretely in the context of mathematics learning. According to Yin (2014), case studies are well-suited for researching contemporary phenomena in real-life contexts....

The subjects of this study were phase B students at SDN 2 Jendi, Selogiri District, Wonogiri Regency, totaling 25 students. The selection of subjects was carried out by purposive sampling, which considered classes that had implemented problem-based learning assisted by a pouch of units. Sugiyono (2017) explains that purposive sampling is very useful in qualitative research because it allows researchers to select subjects who have certain characteristics that are relevant to the research.

Data collection in this study was conducted intensively for two months, from March to April 2024. The researcher was directly involved in the learning process in the classroom through participatory observation, observing the interaction of students and teachers when using a pouch of unit media in problem-based learning. In addition, in-depth interviews were conducted with students and teachers to explore their understanding in depth. Documents such as student work and field notes were also collected to complement the data.

Data analysis was conducted using the Miles and Huberman (1994) model. Data obtained from various sources were then organized, simplified, and presented in a form that was easy to understand. The analysis process included data reduction, data presentation, and conclusion drawing. The validity of the research findings was strengthened through data triangulation, namely by comparing the results of various data sources that had been collected.

RESULTS AND DISCUSSION

This study aims to analyze the impact of applying the Problem-Based Learning (PBL) model assisted by Pouch of Unit media on improving the ability to count units of weight in phase B students at SDN 2 Jendi, Selogiri District, Wonogiri Regency. Through this research, it is hoped that a clear picture can be obtained regarding the effectiveness of PBL in improving the understanding of the concept of unit weight and the active involvement of students in the learning process. PBL as a learning approach that focuses on solving real problems has proven effective in increasing students' motivation and critical thinking skills (Sukardi, 2020).

Based on the results of the questionnaire given to 25 phase B learners, this study measured their perceptions regarding the effectiveness of the application of the Problem-Based Learning (PBL) model assisted with Pouch of unit media in improving their ability to calculate units of weight. The results of the questionnaire showed that the majority of learners felt a significant improvement in their understanding of the material. As many as 88% of the learners stated that their understanding of the unit of weight conversion material improved after using this learning media. This shows that Kantong Satuan media is effective

in helping students understand abstract mathematical concepts, especially in terms of weight unit conversion which can be a challenge for some students.

In addition, 80% of learners felt more actively involved in the learning process. This involvement reflects one of the main objectives of PBL, which is to encourage students to participate more actively in learning and not just act as recipients of information. By using the Pouch of unit media, students became more involved in the discussion and problem solving provided by the teacher. Most students also rated the feedback given by the teacher as very helpful in correcting the mistakes they made, with 80% of students finding the teacher's feedback useful. Constructive and timely feedback is very important in PBL, as it can improve students' understanding and encourage them to keep improving. Overall, 80% of learners expressed satisfaction with the applied learning method, while 84% of students were satisfied with the use of PBL aided by Pouch of unit. This shows that this method not only improves students' understanding but also motivates them to be more engaged and feel good about the way they learn. The following table presents a summary of the questionnaire results that illustrate learners' satisfaction with the applied learning method:

Table 2. Results of demonstration learning

Aspek	Persentase Kepuasan
Keterlibatan peserta didik dalam pelajaran	80%
Pemahaman peserta didik terhadap materi	88%
Kualitas pemberian umpan balik guru	80%
Kepuasan terhadap *Problem Based Learning* berbantuan *Pouch of Unit*	84%

The results of this questionnaire show that the majority of learners feel that the use of Pouch of Unit media helps them understand abstract concepts, especially in terms of weight unit conversion. This is in line with the findings stating that concrete media, such as Pouch of Unit, can improve learners' understanding of abstract mathematical concepts. Previous research also shows that the use of appropriate learning media can improve student motivation and learning outcomes (Halimah, 2019).

During the learning observation, it was seen that students were more active in participating. By using Pouch of Unit, learners showed higher focus in doing weight unit conversion activities. They interacted more often with the teacher and their friends, both in the form of discussions and in solving the problems given. This activeness is one of the indicators of the success of PBL implementation, where students are encouraged to be directly involved in the learning process (Nugroho, 2021). From the observation results, as many as 80% of students actively asked and answered during the learning process. Teachers also consistently provided clear feedback to learners, guided them when they made mistakes, and encouraged learning participation. Providing timely and constructive feedback is very important in the teaching and learning process, as it can help students understand their mistakes and correct them (Hendri, 2020). In addition, more than 84% of learners showed increased focus when Pouch of Unit media was used. Group activities were also seen to be effective in building cooperation between learners, where they helped each other understand the concepts taught.

As a visual illustration, here is a graph depicting the improvement of learners' understanding and engagement after using the Pouch of Unit media::

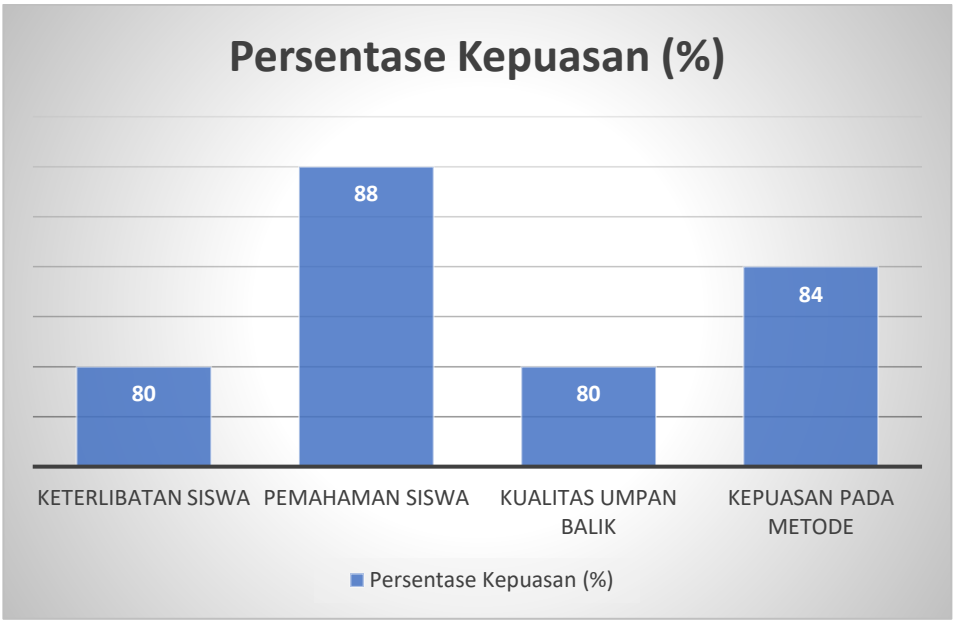

Figure 1. Satisfaction Presentation of Problem-Based Learning Method assisted by Pouch of Unit

The graph above shows that most learners feel involved, understand the material, and are satisfied with the PBL method assisted by Pouch of Unit. The average satisfaction percentage is above 75%, which indicates an overall positive response. This shows that the application of the PBL model assisted by concrete media can have a significant impact on students' understanding and involvement in learning.

The results of interviews with 6 teachers regarding the application of the Project-Based Learning (PBL) learning model assisted by a pouch of units on the material of weight unit conversion showed a positive impact on the learning experience of students, Teachers involved in this study gave a positive response to the PBL learning model assisted by pouch of units. They felt that this model was effective in activating learners thoroughly and allowing them to observe the development of student's social and academic skills more clearly. Teachers also stated that the use of a pouch of units provides variety in the learning process so that it can maintain students' interest in learning. so that students who follow PBL learning assisted by a pouch of units show a deeper understanding of weight unit conversion material. Through activities that require them to solve problems directly, learners are trained to apply the concepts learned to real situations. They also showed improvement in critical and analytical thinking skills. In addition, PBL learning that focuses on group work makes learners more skillful in collaborating and cooperating with their peers. Teachers noted an improvement in learners' ability to share tasks, listen to friends' opinions, and resolve conflicts within the group. It also fosters a sense of responsibility towards group tasks.

Overall, the results showed that the application of the Problem-Based Learning model assisted by Pouch of Unit in learning units of weight had a positive impact. In addition to improving numeracy skills, the use of this innovative learning media also increases students' motivation and involvement in the learning process and strengthens their understanding of the concept of unit weight. The results indicate positive outcomes in terms of learners' understanding, active involvement, and overall satisfaction with the learning

approach. To analyze these findings, it is essential to relate them to established educational theories and research.

Problem-Based Learning (PBL) focuses on using real-world problems as the foundation for learning, where students actively participate in problem-solving processes. This approach encourages deeper understanding, critical thinking, and student autonomy in learning (Sukardi, 2020). The results of this study align with these theoretical assumptions, as 88% of students reported an improved understanding of weight unit conversion, demonstrating the effectiveness of PBL in helping students grasp abstract concepts in mathematics. Research by Nugroho (2021) supports this finding, highlighting that PBL fosters higher engagement and promotes critical thinking skills among students. In this study, students' active participation in discussions and problem-solving activities reflected the success of PBL in promoting engagement and deepening understanding.

The use of the Pouch of Unit media to assist PBL provides a concrete way for students to visualize and manipulate abstract concepts, such as weight unit conversion. This aligns with the theory of the concrete operational stage proposed by Piaget, which suggests that children in the concrete operational stage (typically aged 7-11) can better understand concepts when they are presented in a tangible and hands-on manner (Piaget, 1952). In the study, 84% of learners reported that using the Pouch of Unit media helped them understand abstract mathematical concepts, reinforcing the importance of concrete learning aids in enhancing comprehension. Additionally, Halimah (2019) found that using concrete media in mathematics instruction improves student motivation and learning outcomes. This result is mirrored in the study, where students became more involved in the learning process, showing a higher level of focus and participation during lessons that used Pouch of Unit media.

The importance of feedback in the learning process is widely recognized in educational theory. According to Hattie and Timperley (2007), effective feedback helps students understand what they have done well, where they have gone wrong, and how to improve. In this study, 80% of students found the feedback given by teachers helpful in correcting their mistakes. This is consistent with the theory that constructive feedback can guide learners toward achieving better results and deepening their understanding. Timely and specific feedback in PBL not only aids in correcting errors but also motivates students to engage actively in the learning process.

PBL is known for fostering collaboration among students, as it typically involves group work. Vygotsky's social constructivist theory emphasizes the role of social interactions and collaboration in the learning process. Vygotsky argued that cognitive development is significantly influenced by interactions with more knowledgeable peers and adults (Vygotsky, 1978). In this study, group activities were shown to enhance students' cooperation and social skills, with 80% of students engaging in asking and answering questions during the lessons. Teachers also noted improvements in students' ability to collaborate, share tasks, and resolve conflicts within groups, supporting the idea that PBL not only improves cognitive skills but also enhances social skills and emotional intelligence.

The increase in student motivation and engagement is a notable benefit of using PBL. This is consistent with research by Deci and Ryan (1985), who suggest that when students are given autonomy in learning and engage in problem-solving tasks, their intrinsic motivation increases. The study found that 80% of students felt more actively involved in the learning process after the implementation of PBL, which indicates that the approach fostered intrinsic motivation. Additionally, 84% of students expressed satisfaction with the PBL approach using the Pouch of Unit media, which further supports the conclusion that the method was engaging and motivating for students.

CONCLUSIONS

Based on the results of the research that has been conducted, it can be concluded that the application of the Problem-Based Learning (PBL) model assisted by Pouch of Unit media significantly has a positive impact on improving the ability to count units of weight in phase B students of SDN 2 Jendi, Selogiri District, Wonogiri Regency. The application of the Problem-Based Learning method equipped with concrete media not only increased learners' understanding of abstract concepts in the conversion of units of weight but also increased learners' active involvement in the learning process.

A total of 88% of learners reported an increase in their understanding of the material after using the Pouch of Units media, while 80% of learners felt more actively engaged during the lesson. It also helped learners visualize abstract mathematical concepts, thus strengthening their understanding and motivation to learn. Interview results also showed that the use of Pouch of Unit supported learners in collaborating and interacting more actively during the lesson.

Overall, this study confirms the importance of innovation in the use of concrete learning media in supporting the application of the Problem-Based Learning method, especially in mathematics learning. The findings provide recommendations that Pouch of Unit media can be used as an alternative learning media to help students understand the concept of weight units more deeply and practically.

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