Implementation of Mathematics through Problem-Based Learning Models Assisted by Numbers Media

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Abstrak

Matematika merupakan ilmu dasar yang mempunyai peranan dalam membentuk pola pikir siswa, dalam Matematika siswa dibekali dengan berbagai kemampuan menggunakan berpikir logis, sistematis, analitis, kritis serta kemampuan menggunakan Matematika dalam pemecahan masalah. Kesulitan dalam menelaah Matematika biasa terjadi, apalagi seseorang anak yang sama sekali tak menyukai mata pelajaran Matematika. Media kantong bilangan memudahkan siswa dalam pembelajaran Matematika.. Penggunaan media kantong bilangan ini, diharapkan dapat menghilangkan kebosanan siswa,perhatian, konsentrasi, dan antusias dalam pembelajara. Tujuan penelitian pembelajaran untuk meningkatkan proses pembelajaran dan hasil belajar siswa dalam mata Matematika dengan menggunakan model problem beast learning. Penelitian Tindakan kelas dengan 2 siklus dimulai perencanaa, pelaksanaan, observasi dan refleksi. Hasil penelitian perbaikan siklus I dibandingkan dengan studi awal mengalami kenaikan sebesar 35,29%. Hasil penelitian perbaikan siklus II dibandingkan dengan siklus I mengalami kenaikan sebesar 17,85%. Media pembelajaran yang digunakan merupakan kunci utama keberhasilan proses pembelajaran. Hal ini dibuktikan berdasarkan hasil penelitian perbaikan pembelajaran dapat meningkatkan hasil belajar pada siswa pada pembelajaran matematika.

Kata Kunci:*, Kantong bilangan; Pembelajaran matematika; Problem based learning*

Abstract

Mathematics is a basic science that has a role in shaping students' thinking patterns. In mathematics, students are equipped with various abilities to use logic, systematic, analytical, and critical thinking, as well as to use mathematics in problem-solving. The number bag median makes it easier for students to learn Mathematics. This number bag median is expected to eliminate students' boredom, attention, concentration, and enthusiasm for learning. They are learning research to improve the learning process and student learning outcomes in Mathematics by using the problem beast learning model classroom action research with 2 cycles starting with planning, implementation, observation, and reflection. The results of the first cycle improvement research compared to the initial study experienced an increase of 35.29%. The results of the improvement research in cycle II compared to cycle I experienced an increase of 17.85%. The learning media used is the primary key to the success of the learning process. This is proven based on research results that improving learning can improve student learning outcomes in mathematics learning.

Keywords: Mathematics learning; Number bag; Problem-based learning

INTRODUCTION

Mathematics is one of the sciences that has a role in shaping students' thinking patterns because, in Mathematics, students are equipped with various abilities to use logical, systematic,

analytical, and critical thinking, as well as the ability to use Mathematics in solving problems. Mathematics is a basic science that is always used as an auxiliary tool to solve various fields of science. Mathematics is a branch of science that is necessary for school students. The various reasons for the need for schools to teach mathematics to students can essentially be concluded because of everyday life problems. Mathematics can be used as a teaching and learning process, but to determine the definition, you need to pay attention, not just the correct definition. Furthermore, although elementary schools need to introduce an understanding of mathematical objects, there is no need to introduce specific terms and theorems(Widiasworo, 2018).

The scope of Mathematics includes several things, namely numbers, geometry, and measurement, while numbers themselves are in the first place because, in Mathematics, they are always related to numbers, which include arithmetic operations. Numeracy is the branch of Mathematics that involves concrete numbers with calculations involving addition, subtraction, multiplication, and division. This will make the child experience difficulties in learning Mathematics. Therefore, this problem must be immediately minimized and addressed early on. According to (Juwantara, 2019), learning difficulties are conditions that indicate abnormalities that affect the acquisition, organization, storage of understanding, and use of information both verbally and non-verbally. Understanding concepts is the level of student learning outcomes so that they can define or explain part of or define the learning material using their sentences (Nomleni & Manu, 2018). According to Bloom's Taxonomy theory by Anderson, there are several categories in the cognitive process dimension, namely remembering, understanding, applying, analyzing, evaluating, and creating. Indicators of concept understanding include interpreting, exemplifying, classifying, summarizing, concluding, comparing, and explaining.

The problem is that some students still have difficulty understanding the concepts of arithmetic, division, and multiplication operations (Valentina & Wulandari, 2022). In Mathematics learning, if children experience learning difficulties, this is claimed to be expected; in reality, it is generally like that. Mathematics is considered a science that is difficult to understand because it is abstract, not only for elementary school students but also for university students. However, if examined further, children's learning difficulties are a problem that must be addressed from an early age because they will affect the child's future academic career. Using the correct method will positively impact students' participation in class learning. According to (Juwantara, 2019). This process occurs because children experience cognitive conflict when understanding the world. Therefore, using the correct method will positively impact students' success in participating in classroom learning. A fun, inviting learning process that allows students to be involved in learning is one way to ensure that teaching and learning activities are not monotonous. According to (Amalia and Zuhdi, 2019), students who experience difficulties with multiplication and division can be helped by exciting and fun learning media. Therefore, educators are necessary to foster students' interest in learning and have a role in teaching creatively; in this case, educators need teaching aids (Siubelan, 2020)

This view must be changed with a method that empowers students, namely by using a learning method that does not require students to memorize but a learning method that encourages students to construct knowledge in their minds (Juwantara, 2019). Meanwhile, Problem-Based Learning is a learning approach that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills and gain essential knowledge and concepts from the subject (Lidinillah, n.d.). The problem-solving method presents lessons by encouraging students to look for and solve problems to achieve teaching objectives. According to (Widiasworo, 2018), Problem-Based Learning (PBL) is a learning model in which students are faced with real problems that students have experienced. The problem-solving method presents lessons by encouraging students to look for and solve problems to achieve teaching objectives. Problem-solving methods include presenting the

problem in a more precise form, stating the problem in a more operational form, compiling working hypotheses and working procedures that approximate well, testing hypotheses, and carrying out work that obtains the results that have been obtained (Pramitasari, 2021). The steps in the problem-solving method are learning scientific methods or thinking systematically, logically, and thoroughly. The cognitive goal is to solve problems rationally, directly, and ultimately (Chotimah & Fathurrohman, 2018). Learning is the process of changing people from not being able to become able. Therefore, innovations are needed in this case, namely learning approaches, the use of learning methods, the use of media, etc.

The benefit of learning media is that it can direct a child's attention so that their interest in learning increases. Learning media can prevent limitations of space, time, and senses. Learning media can provide the same experience for every child (Setiowati, 2023). One type of media is three-dimensional media in the form of artificial media. One of the artificial media is a number bag, which will be introduced to determine the place value of numbers. According to(MASULAH & BUDIYONO, 2019), when learning is given a treatment, namely using number bag media, it will affect student learning outcomes because number bag media is concrete.

Saleh (in Mulyasari & Fahrozy, 2023) explains that Number bags are media made from board or cardboard divided into several plots. Each plot is given a different color, and the number bag media is equipped with colored buttons, cards, and a dividing rope. It is hoped that number bag media can eliminate student boredom and increase attention, concentration, and enthusiasm in the learning system.

Based on the description above, the researcher is interested in conducting research titled " Implementation Of Mathematics Learning Division Material Through The Problem-Based Learning (PBL) Model With The Aid Of Number Bag Media To Improve Student Learning Outcomes. " The problem formulation in this research is how far to improve the Mathematics learning process for the class through the Problem Bead Learning model and how to improve student learning outcomes in Mathematics. This research aims to increase students' mastery of division, improve the learning process for Mathematics Subjects, and improve student learning outcomes.

METHODS
Research Subject
The research subjects were class IVC students to improve mathematics learning outcomes using number bag media in class IVC students at SDN Sendangmulyo 03, Tembalang sub-district, Semarang City, academic year 2023/2024, totaling 28 students. This research was carried out using two cycles, with each cycle held in 1 meeting. This research was carried out for approximately three months, from May to August 2023.
Research Procedure
The details of the Classroom Action Research (PTK) cycle with the aim of planned improvement can be seen in Figure 1.
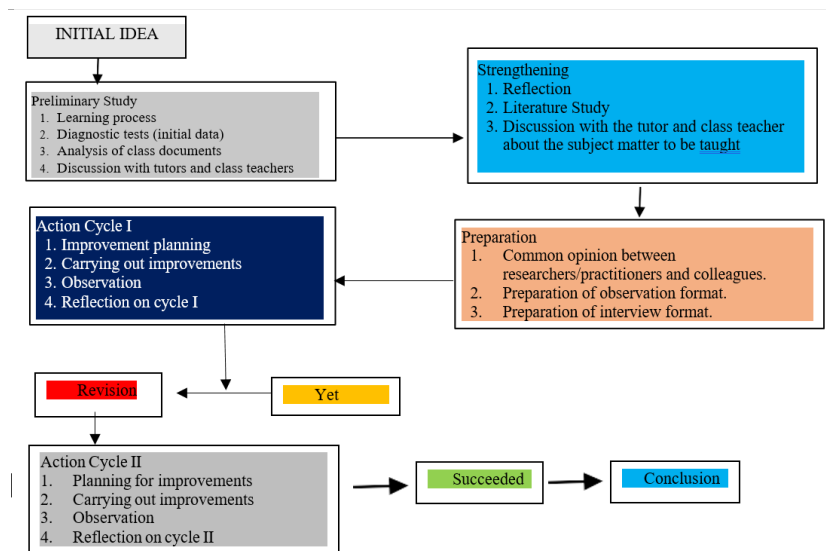
Figure 1. Alur Penelitian Tindakan Kelas (Arikunto, 2013)

Data Collection Technique

The data collection techniques used to collect data are tests and observation sheets for assessing learning improvement. In this case, the formative test is carried out at the end of each learning improvement cycle. The learning improvement assessment observation sheet is used to identify teacher and student behavior in implementing learning through the discussion method. This is used by researchers and teachers as a collaboration when carrying out observations of learning improvements in each cycle.

RESULTS AND DISCUSSION

Before this classroom action research was carried out, the researcher, as a teacher, applied learning using a traditional approach, namely using the lecture method, taking notes, and giving students opportunities to study and test. Learning using conventional methods like this shows that students have no active role. Students to study and test. Learning using conventional methods like this shows that students have no active role. This is visible from the learning process; namely, 20 students out of 28 students, or 71.43%, appear less active. The low percentage of those who play an active role in learning impacts low learning outcomes in mathematics, especially in the division of whole numbers. Learning outcomes from this material can be seen from the prerequisite test scores: the highest score is 90, the average score is 67.14, and the lowest score is 50. Meanwhile, the number of students whose learning results meet the minimum learning completeness standards is seven or 25.00%. Learning using conventional methods, where students are not actively involved, has implications for low student learning outcomes. The result is shown in Table 1.

Table 1. Mathematics Learning Assessment Results for Division Material

No	Indicator	Pre-Cycle	Presents	Cycle I	Presents	Cycle II	Presents
1	Class Average	67,14		73,39		81,07	
2	Students Complete	7	25,00%	19	67,86%	24	85,71%
3	Students Do Not Complete	21	75,00%	9	32,14%	4	14,29%

Source: Data Processing Results, 2023

Table 1 shows that at the end of cycle I, it was clear that there was an increase; namely, the average score was 73.39, with the highest score being 90. The lowest 55, the average score was 73.39, with classical completeness at 67.86%, with the number of students who completed their studies amounting to 19 students. At the end of cycle II, there was a significant increase, namely: the highest value was from 86.67 in cycle I to 93.33 in cycle II, the lowest value was 55 in cycle II, the highest value was 95, the average value increased from 25.00% in cycle I was 67.86% in cycle II with the classical completion percentage being 85.71% and the number of students who completed it being 24 students.

This research aims to improve Mathematics learning outcomes in whole number division material, carried out in 2 cycles in 1 meeting. This research was carried out from May to August of the 2023/2024 academic year in the first semester of class IV C. The overall research results can be seen in Table 2.

Table 2. Results of Observations of Class IV C Students' Learning Activities

No	Indicator	Pre-Cycle	Cycle I	Cycle II
1	Student activities in discussion activities group	28,57%	71,43%	92,86%
2	Student enthusiasm in the following group discussion activity	71,43%	28,57%	7,14%

Cycle I

According to (Isnaini et al., 2023), learning media is required to increase teaching standards more efficiently and help students understand the complex material. Apart from that, choosing the learning media that will be used is the main key to the success of the learning process. This can be seen from the results of learning improvements in the implementation of cycle I, both regarding systematic discussion of the material, application of methods, models, and use of number bag teaching aids, giving formative tests, and giving groups that did not appear optimally, resulting in student learning activities not being optimal. Only 71.43% is included in the less active category, so researchers need to make intensive improvements regarding learning management. From the formative tests conducted by researchers, the class average score was 73.39. The number of students who had completed their studies was 19 (67.86%), while 9 (41.18%) had not. Completion of the first cycle of learning, when compared with the initial study, increased by 35.29%.

Therefore, based on information from researchers' observations of using less than optimal teaching aids, the teaching aids need to be optimized by modifying the teaching aids to facilitate student learning. Teachers are lacking in providing practice questions. Teacher guidance for students is not yet intensive and does not provide opportunities to ask students questions. The impact is that many students still have not yet completed learning the main material for division. Thus, the implementation of Cycle II must be carried out.

Cycle II

According to (Mutho and Habibah, 2018), using number bags can improve students' Mathematics learning outcomes and is considered very effective in helping students learn. Number bag media is a medium that contains components such as numbers, types of colors used to differentiate the dividing numbers and the numbers being divided, and text. This can be seen based on the results of learning improvements in cycle II, which relate to the systematic discussion of the material, the use of teaching aids and number bags, the application of methods, teacher guidance and providing intensive motivation, giving practice questions, giving formative tests and giving group assignments have been carried out by researchers

intensively and carefully. Maximum learning management turns out to have an impact on maximum student activity.

From the activity data, it is known that the activity percentage reached 92.86%. This means an increase of 7.14%. The results of the formative test by researchers were good, with the class average score being 81.07. 24 students had completed their studies (85.71%), and four students had not completed their studies (14.29%). Compared with cycle I, cycle II experienced an increase in student activity of 21.43%. When compared with the completeness of the improvement in cycle II, the completion of the learning cycle I increased by 17.85%.

Thus, it can be concluded that learning with the Problem-based Learning model can increase students' understanding and activity. This can be proven by cycles II and II experiencing a significant increase in learning achievement. This means that learning using number bag teaching aids can improve student learning achievement, especially in Mathematics learning about the concept of division in class IV C, Semester 1, SD Negeri Sendangmulyo 03, Tembalang District, Semarang City, Academic Year 2023/2024.

CONCLUSIONS AND SUGGESTIONS

Based on data analysis and observation results obtained in the Mathematics subject, the main material of the concept of division, it can be concluded that, through teacher guidance and the use of number bag props in Mathematics learning, the main material of counting division in class IVC Semester 1 of Sendangmulyo State Elementary School 03, Tembalang District, Semarang City The 2023/2024 academic year can improve student learning outcomes so that student learning achievement increases. This can be seen based on the learning assessment results from pre-cycle 25.00% to cycle II, which reached 85.71%. Applying the problem-based learning model used in Mathematics learning material for dividing whole numbers can facilitate students' learning difficulties and student activities in learning.

Several students did not understand the joy of using number-bag media in learning activities. This can be a suggestion for using teaching aids: Teachers should need guidance and supervision to implement learning effectively.

REFERENCES

Amalia, T. F., & Zuhdi, U. (2019). Pengembangan Media Pikabi Berbasis Android Pada Materi Perkalian Dan Pembagian Sebagai Media Belajar Siswa Sekolah Dasar. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, *7*(2), 2705–2714.

Arikunto, S. (2013). Prosedur penelitian atau pendekatan praktik. *Cet Xv*, 86–251.

Isnaini, S. N., Firman, F., & Desyandri, D. (2023). Penggunaan Media Video Pembelajaran dalam Meningkatkan Minat Belajar Matematika Siswa di Sekolah Dasar. *Alpen: Jurnal Pendidikan Dasar*, *7*(1), 42–51.

Juwantara, R. A. (2019). Analisis teori perkembangan kognitif piaget pada tahap anak usia operasional konkret 7-12 tahun dalam pembelajaran Matematika. *Jurnal Ilmiah Pendidikan Guru Madrasah Ibtidaiyah*, *9*(1), 27–34.

Lidinillah, D. A. M. (n.d.). *PEMBELAJARAN BERBASIS MASALAH (PROBLEM BASED LEARNING)*. Retrieved April 29, 2024, from http://file.upi.edu/Direktori/KD-TASIKMALAYA/DINDIN_ABDUL_MUIZ_LIDINILLAH_%28KD-TASIKMALAYA%29-197901132005011003/132313548%20-%20dindin%20abdul%20muiz%20lidinillah/Problem%20Based%20Learning.pdf

MASULAH, N., & BUDIYONO. (2019). PENGARUH PENGGUNAAN MEDIA KANTONG BILANGAN TERHADAP HASIL BELAJAR MATEMATIKA MATERI

PEMBULATAN DAN PENAKSIRAN PADA SISWA KELAS IV SDN KEDURUS I SURABAYA. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, *7*(2), 1–10.

Mulyasari, W., & Fahrozy, F. P. N. (2023). Pemahaman Konsep Pada Nilai Tempat Di Sekolah Dasar. *Jurnal Elementaria Edukasia*, *6*(2), 442–452.

Mutho, I., & Habibah, N. (2018). Penggunaan Media Papi (Papan Pintar) untuk Meningktakan Hasil Belajar Matematika Peserta Didik Kelas III pada Materi Bangun Datar SDN Tanjekwagir. *Journal of Indonesian Education*, *1*(1).

Nomleni, F. T., & Manu, T. S. N. (2018). Pengembangan media audio visual dan alat peraga dalam meningkatkan pemahaman konsep dan pemecahan masalah. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *8*(3), 219–230.

Pramitasari, I. (2021). Media Papan Pintar Pancasila sebagai Upaya Peningkatan Hasil Belajar Siswa Kelas II SD Negeri 2 Payaman Nganjuk. *PTK: Jurnal Tindakan Kelas*, *2*(1), 68–76.

Setiowati, S. (2023). Implementasi Metode BSB 3P (Pembelajaran Papan Pintar) Matematika pada Kreativitas Siswa SDN Bareng 1, Nganjuk. *Sains Data Jurnal Studi Matematika Dan Teknologi*, *1*(1).

Siubelan, B. C. (2020). *Upaya Guru Pak Dalam Meningkatkan Minat Belajar Siswa Kelas 1 Sd Waikabubak Menggunakan Alat Peraga.* https://doi.org/https://doi.org/10.31219/osf.io/ucjyx

Widiasworo, E. (2018). Strategi pembelajaran edutainment berbasis karakter. *Yogyakarta: Ar-Ruzz Media*.