

The Implementation of Problem-Based Learning on Multiplication and Division Lessons in Improving Elementary School Students' Learning Motivation

Arum Fatayan¹, Safrul², Abd Rahman A Ghani³, Sartika Ayu⁴

^{1,2,3,4}Elementary School Teacher Education, Muhammadiyah University of Prof. Dr. Hamka, Indonesia

arum_fatayan@uhamka.ac.id¹, [safrul@uhamka.ac.id](mailto:safirl@uhamka.ac.id)², rahman.ghani@uhamka.ac.id³,
sartikaayu16022000@gmail.com⁴

ABSTRACT

Article History:

Received : 03-06-2022
Revised : 19-08-2022
Accepted : 23-08-2022
Online : 08-10-2022

Keywords:

Problem Based
Learning;
Multiplication and
Division;
Motivation to learn.



This study aims at increasing elementary school students' learning motivation in multiplication and division lessons by implementing problem-based learning. This study was qualitative research. Furthermore, the research subjects were elementary school students. Results indicated that students experienced an increased motivation in multiplication and division lessons after implementing problem-based learning because they felt happy during the learning process. In addition, observations, interviews, and documentation studies showed that, with problem-based learning, many students better understood the concepts of multiplication & division and applied them in their daily life. Moreover, students thought critically in solving problems when the learning process was carried out in discussion or groups. This study proves that teachers are the key to success in a learning process and the increased student motivation. Therefore, teachers must be able to choose the right learning method for students to encourage their enthusiasm for learning.



<https://doi.org/10.31764/jtam.v6i4.9084>



This is an open access article under the CC-BY-SA license



A. INTRODUCTION

Subject matter that is close to the daily life of each student is expected to be meaningful and absorbed by all students. The various characteristics of students who have a uniqueness in each learning process make it a challenge for teachers to provide meaningful learning. In addition, the subjects that must be taught also vary. One of them is mathematics. To date, mathematics is still regarded as a torment for some students because they think it is one of the "very scary subjects". It is strengthened by the methods applied by teachers which are still procedural (conventional) so that the concept of the lesson is not conveyed fully to students (Alghamdi et al., 2020). This condition makes students less active and bored in the learning process. As a result, mathematics becomes a frightening and difficult subject. This must be an evaluation for teachers to open new minds for students so that mathematics may become a "fun and easy" lesson.

Currently, many different methods can be applied to make the learning process fun and meaningful, positioning the teachers as the main actor. Teachers can incorporate creativity and

innovation in every learning process. One of the methods that can be used is problem-based learning. The implementation of this method in the learning process must be appropriate, good, and correct so that the process can provide optimal results and produce encouragement for students to receive lessons. The implementation of problem-based learning by providing contextual problems around the lives of students in metacognition can have a positive impact on the learning process by continuing to practice consistently. Apart from being seen from the side of the method, the application of problem-based learning assisted by teaching aids or learning media can foster student learning motivation, learning activities, and problem-solving skills (Al Said et al., 2019).

Learning is a routine activity that is very important for everyone. In real life, the learning process becomes an important thing and lasts forever (long-life learner) even though every human being has their respective way in the process (Van der Wal-Maris et al., 2019). Learning motivation is an encouragement that comes from outside or within each individual to bring about a behavior change. In learning, each individual has goals to be achieved, which must be supported by the willingness to learn, the essence of the need for learning, plans for the future, fun activities, and an efficient learning environment (Van Harsel et al., 2019). Therefore, with learning motivation, every learner can carry out activities diligently and responsibly (Stoyanova et al., 2018).

Problem-based learning is a learning method applied to students with the concept of a complex and open problem, aiming at developing critical thinking skills, increasing problem-solving skills, and serving as a communication tool in lifelong learning (Ali, 2019). This method can be linked to various aspects of students' daily lives so that the implementation of this problem-based learning can be very relevant, meaningful, and contextual. Through this method, the teachers demand students for being active in finding problems independently or in groups and being able to explain their findings contextually and systematically.

Mathematics is a subject that can build students' thinking patterns and provide clear, precise, and definite arrangements and decisions. In an educational institution, mathematics is one of the main subjects. Mathematics as a subject is a systematic arrangement in which there is an interaction between teachers and students. In it, a teaching and learning process occurs to form, build, and develop students' thinking patterns (Nurlailly et al., 2019). In the mathematics learning process, mathematics has several characteristics, namely having patterns and relationships, observing abstract objects, having a deductive mindset, forming a high level of creativity, providing problem-solving activities, and serving as a tool for communication (Nurhayati et al., 2019).

B. METHOD

The type of qualitative research used in this study was case study qualitative. The case study was chosen because this method can solve problems in detail and prioritize the genuineness of its process (Berends & Deken, 2021). In this study, researchers conducted interviews and observations to collect the searched data. This research was conducted at elementary school which is one of the schools in Jakarta. The research subjects were the fourth-grade students, totaling 25 students and one fourth grade teacher.

The stages of this research are that the researcher conducts a literature review by reviewing journal related to the implementation of problem-based learning on multiplication and division material. Next, the researcher determined the problems related to multiplication and division in elementary school. Then determine the research method that will be used in the study. In addition, researchers developed research instruments in the form of observation, interviews, and documentation guidelines. Collecting data by observing fourth graders during the multiplication division math learning activities and direct interview with one fourth grade teacher at elementary school, as well as documentation for each carrying our data collection to obtain accurate evidence in this study. The data that has been collected is analyzed by researchers to be able to draw conclusions and results from research that has been carried out regarding the implementation of multiplication and division problem-based learning to motivate fourth grade elementary school students. Flow chart of research stages as shown in Figure 1.

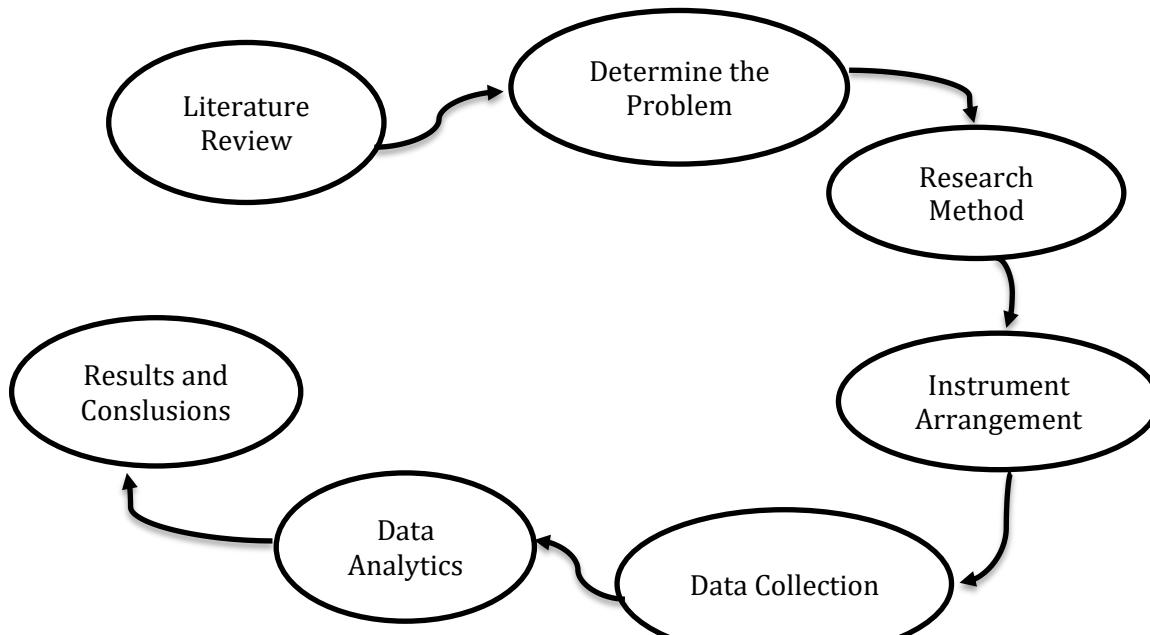


Figure 1. Flow Chart Research Stages

The employed data collection procedure in this study was the triangulation technique. Triangulation is known as accumulating data by combining the components of various data collection techniques, such as observation, interviews, and documentation as well as existing data sources to be concluded (Roth & Unger, 2018). The observation was carried out by observing the learning process in the classroom and the preparation of the school program. It was then followed by interviews with the informants concerned. At the same time, researchers also documented related activities. The collected data were then analyzed using Miles & Huberman's data analysis, consisting of three stages: data reduction, data display, and concluding or verification (Johnson et al., 2020), as shown in Figure 2.

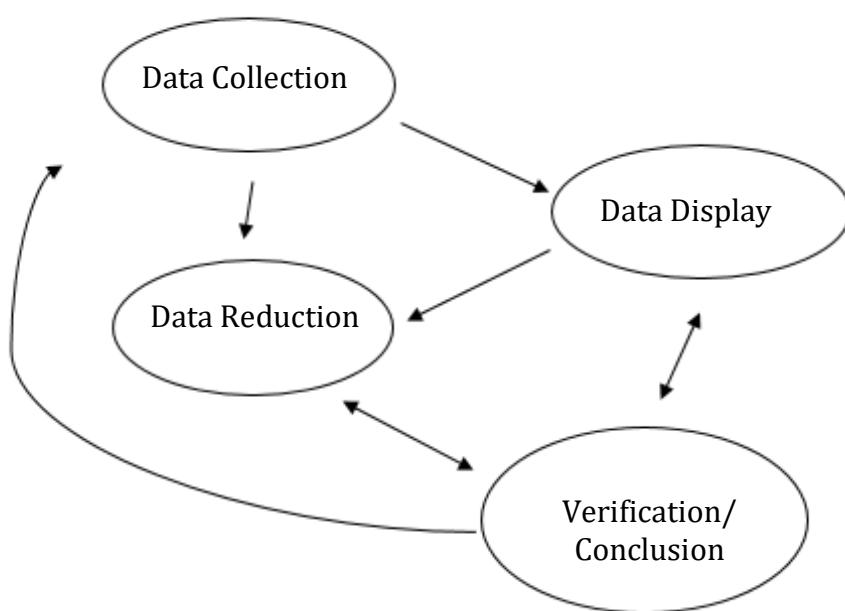


Figure 2. The Technique of Data Analysis from Miles & Huberman, 1992

Concerning the validity of the data, the researchers reviewed data collected from interviews and then correlated them with the data generated from observations and documentation. The results presented the correlation between one data and another. After that, we could ensure which data were correct, different, or false because the use of more than one data collection technique aimed at complementing each other to gain comprehensive data, as shown in Figure 3.

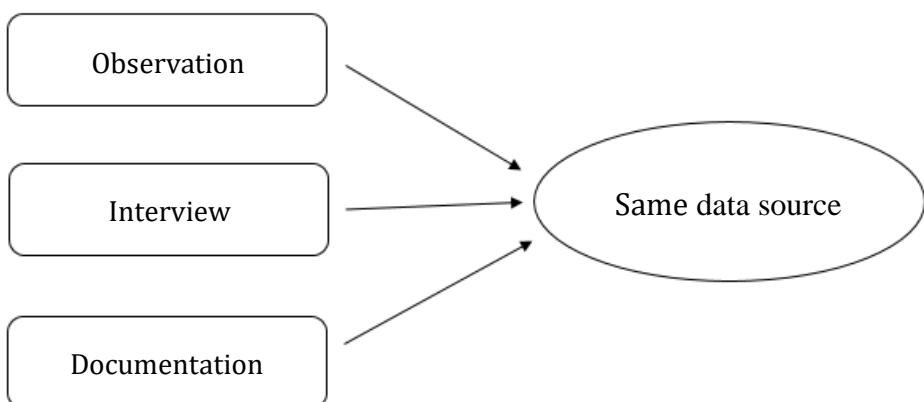


Figure 3. The Triangulation Technique

C. RESULTS AND DISCUSSION

1. Results

Based on the results of interview conducted by researchers with one fourth grade elementary school teacher regarding the low ability of students in multiplication and division in fourth grade elementary school students. In table 1, it can be seen that the student's difficulties regarding multiplication and division as shown in Table 1.

Table 1. Results of Multiplication and Division Learning Interview

Informant	Interview Result
Teacher	Students don't like multiplication and division.
	Memorization learning method.
	Students are lazy to learn multiplication and division.
	Selection of learning methods that are less precise and boring.
	Lack of student motivation in multiplication and division.
	Students see and hear questions about multiplication and division immediately say "Hard and difficult".

Based on results of interviews that have been carried out by implementing the problem-based learning method, it has an influence on students learning motivation regarding multiplication and division. Fourth grade become more enthusiastic and interested in multiplication and division. In addition, the teacher relates and connects multiplication and division with student's daily lives in problem-based learning multiplication and division making learning multiplication and division fun and not scary. Students are easier to understand the material. Therefore, the researchers chose to implement the problem-based learning method to increase student's curiosity. Then, create interest and motivation of students in learning multiplication and division. Documentation of the implementation school teacher as shown in Figure 4.

**Figure 4.** Conducting Interviews Teachers

2. Discussion

Problem-based learning emphasizes the learning process that is centered on students, while the teacher only serves as a facilitator for students to learn in group discussions (Aini *et al.*, 2019). Participants play an active role in learning, making them have to understand the lesson being taught. In addition, problem-based learning allows students to learn to identify problems and issues regarding multiplication and division in the real world so that the knowledge gained from the lessons can be implemented in their daily lives (Van Der Vleuten & Schuwirth, 2019). Problem-based learning is considered to be able to overcome problems regarding multiplication and division on students' learning motivation. It aims at increasing the awareness of students to be able to enjoy the mathematics lesson and change their mindset about mathematics (Xin, 2019). In other words, its purpose is to make mathematics not a scary subject but fun.

In general, students who can understand and complete multiplication can certainly divide. Multiplication and division are related to each other or have a relationship (Deringöl, 2019;

Polotskaia & Savard, 2021). The errors of elementary school students in understanding the concept of multiplication and division are that they find it difficult to understand lessons, lack mastery, are not accustomed to or trained in multiplication and division, and lack accuracy in performing multiplication and division operations (Milton et al., 2019). In addition, the teacher when teaching multiplication and division only focuses on repeating numbers continuously. The teacher should explain the meaning of multiplication and division to make it easier for students. Multiplication is defined as the addition of numbers, while division is defined as measuring or subtracting numbers (Coskun, 2019).

Learning motivation serves as a driver of interest for students in the learning process. In addition, high motivation can improve or produce good learning outcomes for the students (Chen, 2019). Therefore, encouragement and support that motivate students are highly needed both internally and externally. By having so, the learning process may become light to be carried out by students because of having no coercion. Learning motivation that arises from within will make them easier to understand the multiplication and division lessons given by the teacher. As a result, the knowledge they get becomes useful (Bishara, 2018). Moreover, students become focused and have a clear direction in achieving learning goals while playing an active role in discussion activities or the learning process (John et al., 2020). For this reason, teachers must be able to increase students' motivation and awareness of the importance of learning mathematics, especially multiplication and division lessons which are very much needed in real-life situations. Problem-based learning can be a solution to improving students' understanding of multiplication and division because students are asked to think critically and be able to solve problems.

D. CONCLUSION AND SUGGESTIONS

The learning process which implements the problem-based learning method can increase students' learning motivation regarding multiplication and division. One of the factors causing an increase in students' learning motivation and understanding is a sense of pleasure which serves as a driving force for students to be enthusiastic in the learning process. By having so, students can easily understand the concept of multiplication and division. One of the inhibiting factors for elementary school students is the learning model used by the teacher which is still traditional, thereby creating a tense learning atmosphere that makes students afraid, especially in the mathematics subject. Problem-based learning is a contextual learning method that is centered on students and is related to students' daily lives. It encourages students to think critically and study learning materials independently or in groups through discussion.

In this study, researchers suggest teachers used based-learning methods to increase students' learning motivation regarding multiplication and division. The goal is that students feel happy in learning multiplication and division. Through problem-based learning students can solve problems in everyday life regarding multiplication and division. Thus, learning becomes interesting for students, besides that students will be able to more easily remember and understand multiplication and division, especially in fourth grade elementary school students. Therefore, it is important to choose the right learning method and according to the material and characteristic of students in the classroom.

ACKNOWLEDGMENT

We would like to thank several parties and colleagues at Muhammadiyah University of Prof. Dr. Hamka who has provided support to the researchers so that this study can be completed on time.

REFERENCES

- Aini, N. R., Syafril, S., Netriwati, N., Pahrudin, A., Rahayu, T., & Puspasari, V. (2019). Problem-Based Learning for Critical Thinking Skills in Mathematics. *Journal of Physics: Conference Series*, 1155(1). <https://doi.org/10.1088/1742-6596/1155/1/012026>
- Al Said, R. S., Du, X., Al Khatib, H. A. H. M., Romanowski, M. H., & Barham, A. I. I. (2019). Math teachers' beliefs, practices, and belief change in implementing problem based learning in Qatari primary governmental school. *Eurasia Journal of Mathematics, Science and Technology Education*, 15(5). <https://doi.org/10.29333/ejmste/105849>
- Alghamdi, A., Jitendra, A. K., & Lein, A. E. (2020). Teaching students with mathematics disabilities to solve multiplication and division word problems: the role of schema-based instruction. *ZDM - Mathematics Education*, 52(1), 125–137. <https://doi.org/10.1007/s11858-019-01078-0>
- Ali, S. S. (2019). Problem Based Learning: A Student-Centered Approach. *English Language Teaching*, 12(5), 73–78. <https://doi.org/10.5539/elt.v12n5p73>
- Berends, H., & Dekken, F. (2021). Composing qualitative process research. *International Journal of Qualitative Methods*, 19(1), 134–146. <https://doi.org/10.1177/1476127018824838>
- Bishara, S. (2018). Active and traditional teaching, self-image, and motivation in learning math among pupils with learning disabilities. *Cogent Education*, 5(1). <https://doi.org/10.1080/2331186X.2018.1436123>
- Chen, Y. C. (2019). Effect of Mobile Augmented Reality on Learning Performance, Motivation, and Math Anxiety in a Math Course. *Journal of Educational Computing Research*, 57(7), 1695–1722. <https://doi.org/10.1177/0735633119854036>
- Coskun, S. D. (2019). An Examination of Meanings and Error Types Associated with Pre-service Elementary Teacher's Posed Problems for the Multiplication and Division of Fractions. *European Jurnal Of Education Studies*, 6, 99–113. <https://doi.org/10.5281/zenodo.3334334>
- Deringöl, Y. (2019). Misconceptions of primary school students about the subject of fractions. *International Journal of Evaluation and Research in Education*, 8(1), 29–38. <https://doi.org/10.11591/ijere.v8i1.16290>
- John, J. E., Nelson, P. A., Klenczar, B., & Robnett, R. D. (2020). Memories of math: Narrative predictors of math affect, math motivation, and future math plans. *Contemporary Educational Psychology*, 60(January), 101838. <https://doi.org/10.1016/j.cedpsych.2020.101838>
- Johnson, J. L., Adkins, D., & Chauvin, S. (2020). A Review of the Quality Indicators of Rigor in Qualitative Research. *American Journal of Pharmaceutical Education*, 84(1), 138–146. <https://doi.org/10.5688/ajpe7120>
- Milton, J. H., Flores, M. M., Moore, A. J., Taylor, J. J., & Burton, M. E. (2019). Using the Concrete-Representational-Abstract Sequence to Teach Conceptual Understanding of Basic Multiplication and Division. *Learning Disability Quarterly*, 42(1), 32–45. <https://doi.org/10.1177/0731948718790089>
- Nurhayati, Marhayani, D. A., Chang, C. H., & Naaranoja, M. (2019). Math Anxiety Analysis in Indonesian Elementary School. In *Communications in Computer and Information Science* (Vol. 1011). Springer International Publishing. https://doi.org/10.1007/978-3-030-20798-4_25
- Nurlailly, V. A., Soegiyanto, H., & Usodo, B. (2019). Elementary school teacher's obstacles in the implementation of problem-based learning model in mathematics learning. *Journal on Mathematics Education*, 10(2), 229–238. <https://doi.org/10.22342/jme.10.2.5386.229-238>
- Polotskaia, E., & Savard, A. (2021). Some multiplicative structures in elementary education: a view from relational paradigm. *Educational Studies in Mathematics*, 106(3), 447–469. <https://doi.org/10.1007/s10649-020-09979-8>
- Roth, W. M., & Unger, H. von. (2018). Current Perspectives on Research Ethics in Qualitative Research. *Journal of Optical Technology*, 68(3), 216. <https://doi.org/10.1364/jot.68.000216>

- Stoyanova, M., Tuparova, D., & Samardzhiev, K. (2018). Impact of motivation, gamification and learning style on students' interest in maths classes – a study in 11 high school grade. *Advances in Intelligent Systems and Computing*, 716, 133–142. https://doi.org/10.1007/978-3-319-73204-6_17
- Van Der Vleuten, C. P. M., & Schuwirth, L. W. T. (2019). Assessment in the context of problem-based learning. *Advances in Health Sciences Education*, 24(5), 903–914. <https://doi.org/10.1007/s10459-019-09909-1>
- Van der Wal-Maris, S., Beijaard, D., Schellings, G., & Geldens, J. (2019). Exploring changes in student teachers' meaning-oriented learning. *Journal of Education for Teaching*, 45(2), 155–168. <https://doi.org/10.1080/02607476.2018.1548171>
- Van Harsel, M., Hoogerheide, V., Verkoeijen, P., & Van Gog, T. (2019). Effects of different sequences of examples and problems on motivation and learning. *Contemporary Educational Psychology*, 58(March), 260–275. <https://doi.org/10.1016/j.cedpsych.2019.03.005>
- Xin, Y. P. (2019). The effect of a conceptual model-based approach on 'additive' word problem solving of elementary students struggling in mathematics. *ZDM - Mathematics Education*, 51(1), 139–150. <https://doi.org/10.1007/s11858-018-1002-9>