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The Influence Of Problem-Based Learning Strategies And Learning Styles On Mathematics Learning Outcomes Class V Students Of State Private Primary School Datuk Fifty Batubara District

Elvi Nurhayati Selian[1], Efendi Napitupulu[2], Tian Abdul Aziz[3]
[1,2,3]Graduate Program, Universitas Terbuka, Indonesia

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ABSTRACT

The research aims to determine the differences in student learning outcomes taught using problem-based learning strategies with expository learning in class V of SD Negeri Datuk Limapuluh District, Batubara Regency. Differences in learning outcomes of students who have visual, kinesthetic and auditory learning styles in class V of SD Negeri Datuk Limapuluh District, Batubara Regency. The interaction between learning strategies and learning styles on student learning outcomes. Based on the results of the ANOVA test, the value obtained was sig=0.036<sig.0.05, thus proving that there was an interaction between learning strategies and learning styles on student learning outcomes. The sample was determined as 60 people consisting of 2 (two) classes. The research design used in this research is experimental. There are differences in learning outcomes for students who have visual, kinesthetic and auditory learning styles in class V of SD Negeri Datuk Limapuluh District, Batubara Regency. There is an interaction between learning strategies and learning styles on student learning outcomes. Based on the results of the ANOVA test, the value obtained was sig=0.036<sig.0.05, thus proving that there was an interaction between learning strategies and learning styles on student learning outcomes.

Corresponding Author:
Elvi Nurhayati Selian
Universitas Terbuka
elviselian5@gmail.com

INTRODUCTION

Mathematics lessons have a very important role in our daily lives and in the development of science and technology. Mathematics learning is related to the basic language of science. A strong understanding of mathematical concepts makes it easier for students to understand other subjects such as physics, chemistry and economics. Mathematics provides the logical foundation necessary to explore complex concepts in a variety of scientific fields. The fact that Indonesia's mathematics achievement (411) is still below Malaysia (508) and much lower than Singapore (605) shows that there are significant differences in mathematics education achievement between the three countries. Differences in mathematics curricula and teaching methods applied in each country can influence student achievement. A less

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relevant curriculum or ineffective teaching methods can lead to shallow understanding of concepts.

The use of inappropriate teaching methods can be a major factor in low mathematics achievement in various educational contexts. Ineffective methods may fail to connect mathematical concepts to students' daily lives. As a result, students may be less motivated and interested in understanding the material, because they have difficulty seeing the relevance of these concepts in their lives. Teaching methods that are monotonous and less interactive can reduce student engagement. Learning mathematics requires problem solving and understanding concepts, and less interactive methods can hinder students' ability to participate actively.

(Firma Yudha, 2019) states that mathematics plays an important role in improving the quality of human resources who have competencies as the basis of their education which include: analytical, individual competencies, the ability to act, process information and organize change. Apart from that, mathematics contributes to facing the very rapid development of science and technology. Even in various disciplines mathematics provides consistent notation and language to present ideas and relationships between concepts. Mathematics allows us to model and abstract natural phenomena and real-world situations.

Even though mathematics has an important role in the development of science and daily life, there is the fact that mathematics learning is still a concern in some areas. Some students may have difficulty understanding mathematical concepts. These gaps in understanding may arise due to inappropriate teaching approaches, lack of adequate resources, or differences in individual learning styles. Often, students may find it difficult to see the relevance of the math concepts learned in school to their everyday lives. Lack of practical application can make learning feel monotonous and difficult to motivate. Some students may develop a fear of mathematics, which can hinder their motivation and learning abilities. Factors such as previous negative experiences or pressure to achieve a certain level may contribute to this fear. Some schools may experience limited resources, whether in the form of textbooks, equipment, or educational software. Additionally, a shortage of qualified mathematics teachers can be a barrier to effective delivery of the material.

(Santi, et al 2019) emphasized that students' difficulties in mathematics have an impact on students' low ability to solve mathematical problems. This view is in line with the results of the 2018 Program for International Student Assessment (PISA) which involved 600,000 students with an average age of 15 years. There are at least 12,098 students from 399 schools in Indonesia who participated in PISA 2018 (OECD, 2019). However, PISA 2015 was attended by 6,513 students from 232 schools in Indonesia.

The fact that Indonesia's mathematics achievement (411) is still below Malaysia's (508) and much lower than Singapore's (605) shows that there are significant differences in mathematics education achievement between the three countries. Differences in mathematics curricula and teaching methods applied in each country can influence student achievement. A less relevant curriculum or ineffective teaching methods can lead to a shallow understanding of concepts. The use of inappropriate teaching methods can be a

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major cause of low mathematics achievement in many educational contexts. Inappropriate teaching methods may not be able to relate mathematical concepts to students' daily lives. This can lead to a lack of motivation and interest in understanding the material, because students may have difficulty seeing the relevance of these concepts in the context of their lives. Teaching methods that are monotonous and less interactive can reduce student engagement. Learning mathematics requires problem-solving and understanding concepts, and less interactive methods can hinder students' ability to participate actively.

According to (Tasya and Prasetyo 2019), there are several factors that influence mathematics learning outcomes, namely internal factors and external factors. To overcome this problem, teachers must be wise in determining an appropriate learning model that can create conducive situations and conditions so that the teaching and learning process can take place according to the expected goals and students can be more active. According to (Bayu Romadon, 2019) that strengthening mathematics education will be able to become a strong supporting force to produce superior human resources who choose skills and abilities in various things, namely systematic analytical abilities, good interpersonal skills, ability to act, ability to process things. problem carefully. This realm of ability can be achieved through competent strategies, namely learning through a scientific approach, a learning model that collaborates all aspects, and the most important thing is strengthening mathematics education through mathematical literacy skills.

Therefore, teachers should be aware that some of the learning methods used in the classroom when delivering lesson materials for student participation and involvement have limitations due to a lack of opportunities to participate actively. Low student engagement can have a negative impact on their understanding and motivation for mathematics. According to (Wardhana, 2019) learning is a process or effort made by each individual to achieve changes in behavior, both in the form of knowledge, skills, attitudes and positive values as an experience from various material that has been studied. Based on the explanation of (Darsini, et al. 2019), the knowledge possessed by humans is the result of efforts made by humans in searching for the truth or problem they face. Activities or efforts made by humans to seek the truth or problem they face is basically the nature of humans themselves or better known as desires. The desires possessed by humans will provide encouragement for humans themselves to get everything they want. What differentiates one human from another is the effort a human makes to obtain their desires. In a narrower sense, knowledge is something that only humans can possess.

According to (Novarita, 2019), the world of education, which is philosophically seen as a tool or forum for educating and shaping human character for the better (humanization), is now starting to shift or become disoriented. Without education, it is absolutely impossible for a human group to live and develop with the ideals of progress, prosperity and happiness according to the concept of their worldview. Therefore, through the learning method process, it is hoped that in the future the process of improving human resource development can be well embedded.

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According to (Febryananda, 2019), learning is a mastery that a student or person gains after they are able to absorb a learning experience and change their behavior due to the knowledge or experience they have gained. Furthermore, (Handayani and Subakti, 2020), explained that learning is a complex process that affects everyone and lasts a lifetime from early childhood to old age. A sign that someone has learned something is a change in their behavior. These behavioral changes not only include changes in knowledge and skills, but also changes in values and attitudes. Learning is a series of cognitive processes that transform environmental stimulation into new skills through processing new information.

In achieving mathematics learning objectives, it is first done by designing learning strategies that will be applied in implementation. In implementing learning activities, teachers carry out plans that have been made well, apart from that there are several learning strategies that occur spontaneously outside of planning. Meanwhile, in evaluating learning strategies, teachers carry out assessments by giving tests to students at the end of learning activities. In determining this strategy the teacher pays attention to the characteristics of the students and the allocation of time needed. In the learning process, it can be seen that students are very enthusiastic about participating in learning activities and the learning outcomes obtained by students are also quite good so that learning objectives can be achieved (Deyana Nuru Intan et al, 2022).

According to (Agustina and Siswondi, 2021), teachers are required to effectively choose methods, strategies, materials, media and evaluation tools that can be used in accordance with learning objectives. The success or failure of a teaching and learning activity process depends on many factors such as: teaching media, motivation, student participation, and the potential of teachers and students. One way, according to (Hotimah, 2020), is through problem-based learning or PBL, which is learning that emphasizes solving real problems as the main method for understanding and mastering certain concepts. Problem based learning (PBL) is a learning method that is triggered by problems, which encourages students to learn and work cooperatively in groups to obtain solutions, think critically and analytically, and be able to determine and use appropriate learning resources.

According to (Vindiasari, 2024), the aim of implementing the problem based learning method is to encourage students to carry out independent learning that lasts a lifetime. Apart from that, problem based learning emphasizes collaboration and teamwork which can influence the quality of the work produced. As a form of active learning, problem based learning (PBL) is able to encourage knowledge and integrate learning in educational institutions with real life dynamics. That way, students can learn how to develop flexible knowledge and improve their own knowledge, problem solving skills, gain intrinsic motivation, exchange ideas, and collaborate.

Furthermore, according to (Deswita, 2024) that student learning styles are important because understanding each individual's learning preferences can help teachers develop more effective teaching methods. By understanding student learning styles, teachers can present information using an appropriate approach, increasing student understanding and

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student engagement in learning. This creates a more efficient learning environment and supports the optimal development of student potential. Based on the explanation above, it can be understood that to achieve maximum results, teachers should plan in advance regarding the learning they will carry out in the classroom. To build a learning atmosphere that is not stiff and boring, teachers can use various learning strategies and methods to make it fun and active. This is also influenced when teachers understand that each student has a different learning style from one another.

The results of observations of mathematics learning in class V of SD Negeri 03 Simpang Dolok Datuk Limapuluh Batubara Regency found that students' difficulties in solving mathematics practice questions could be influenced by several factors. Difficulty in solving math problems may be related to a lack of understanding of basic concepts. Students may not yet have a strong foundation in understanding formulas, mathematical operations, or other key concepts needed to solve problems. Students may experience difficulties because they have difficulty relating mathematical concepts to real-world situations or everyday life problems. Understanding concepts without practical application can make it difficult for students to solve problems that require applied thinking. Solving math problems requires strong problem-solving skills. If students lack training in analyzing problems, designing solution strategies, and evaluating results, they may face difficulties in solving complex problems.

Difficulty in understanding the concepts and nature of mathematics subject matter can have a significant negative impact on student learning. Difficulty in understanding mathematical concepts can hinder the development of problem-solving skills. Students may have difficulty applying these concepts to identify and solve complex mathematical problems. Difficulty in understanding mathematical material can increase the level of frustration and lower students' self-confidence. Teachers who make learning improvements contribute to improving the quality of learning. They can evaluate and identify aspects that need to be improved in their teaching methods to provide a better learning experience to students. Instructional improvements enable teachers to respond better to students' needs and learning styles. By adapting teaching methods, teachers can make learning more relevant and motivate students to participate actively.

Teachers need to adapt their learning strategies according to students' needs and characteristics. By understanding the learning style, level of understanding, and uniqueness of each student, teachers can develop learning strategies that support the success of each individual. Teachers play a role in integrating technology and innovation into learning. Leveraging digital tools and innovative approaches helps increase the appeal and effectiveness of learning, creating a more dynamic experience. A problem-based learning strategy is an approach that focuses on solving real problems as a way to support students' understanding of concepts and skill development. This strategy places students in situations where they are faced with real problems or tasks that have relevance in everyday life or the real world. This helps students to relate learning to practical contexts.

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Inappropriate teaching methods can have a significant impact on students' low mathematics achievement. The inability of this method to relate mathematical concepts to students' daily lives can reduce their motivation and interest in studying the material, because the relevance of these concepts is difficult to understand in the context of their lives. As in research conducted by (Prasetyo, 2019), it is known that there are several factors that cause and influence low student learning outcomes, including (1) internal factors, namely those that come from within the student, such as lack of interest and motivation of students when learning mathematics (2) external factors, namely those that come from outside the student, such as methods teachers who are not attractive to students.

Understanding external factors that can influence the success and achievement of learning, teachers should be able to choose teaching methods that can attract students' attention and enthusiasm for learning. As the results of research carried out by (Deswita, 2024), it is explained that teachers can present information using an appropriate approach, increasing student understanding and student involvement in learning. Furthermore, (Husnul Hotimah, 2020), emphasized that in the teaching and learning process, it is the teacher who delivers lessons, solves problems that occur in class, learning using the problem based learning method can improve students' ability to tell stories, especially at elementary level students. Based on the results of this research, in the future teachers should feel called to carry out learning in various ways and methods so that the goals of education are maximized and learning becomes enjoyable for students.

METHODS

This type of research includes quasi-experimental research, which aims to test and validate whether or not there are consequences from something imposed on students, namely students. This research involved two sample classes that were given different treatments. The experimental class was given treatment, namely a problem-based learning model, while the control class was given expository learning which is usually done by schools.

The research design is a 2x2 factorial design. With this design, a comparison will be made of the impact between the use of problem-based learning strategies and expository learning strategies on mathematics learning achievement. The analysis will focus on student learning styles, especially visual and kinesthetic learning styles, which are expected to influence students' achievement of mathematics learning outcomes. For more clarity on the design of this research, it can be seen in Table 1 below:

Table 1 2 x 3 Factorial Research Design

Learning Strategy (S) / Learning Style (B)	Learning Strategy Problem-Based (A1)	Learning strategies Expository (A2)
Visuals (B1)	A1B1	A2B1
Kinesthetic (B2)	A1B2	A2B2
Auditory (B3)	A1B3	A2B3

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Information :
A = Learning strategy
B = Learning Style
A1 = Problem Based
A2 = Expository
B1 = Visual learning style
B2 = Kinesthetic learning style
B3 = Auditory learning style

RESULTS AND DISCUSSION

Research result

Based on the results of the processing and analysis of research data, can be presented in the following table:

Table 2 2 x 3 FACTORIAL ANOVA TEST RESULTS

Tests of Between-Subjects Effects

Dependent Variable: Learning Outcomes					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Strategy	2261.307 [a]	5	452,261	16,369	,000
Intercept	356002.544	1	356002.544	1.28944	,000
Strategy	443,065	1	443,065	16,036	,001
Learning_Style	1609,699	2	804.849	29,131	,003
Strategy * Learning_Style	193,299	2	96,649	3,498	,036
Error	1491.943	54	27,629		
Total	455287,000	60			
Corrected Total	3753.250	59			

a. R Squared = .602 (Adjusted R Squared = .566)

Based on Table 2 of the 2x3 Factorial ANOVA Test Results above, the following explanation can be put forward. The calculated value of sig=0.001 is smaller than the value of sig=0.05. Therefore, H_0 is rejected. The conclusion is that there are differences in the learning outcomes of students who are taught using problem-based learning strategies and expository learning strategies. The calculated value sig=0.003 is smaller than sig=0.05. This means that H_0 is rejected, so it can be concluded that there is an influence of learning style on student learning outcomes whether taught with problem-based strategies or with expository learning. It was found that the significance value (sig) of 0.036 was smaller than the predetermined value of sig=0.05, which indicated rejection of H_0. Therefore, it can be concluded that the student learning style category influences student learning outcomes. Apart from that, from the table results it can also be seen that for the interaction factor between learning strategies and student learning styles, the significance value (sig) of 0.010 is also smaller than sig = 0.05, (0.036 < 0.05).

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The aim of the research is to provide a detailed description of the influence of problem-based learning strategies and learning styles on student learning outcomes. In this context, research aims to evaluate students' level of understanding and achievement in a particular subject matter or topic through the use of tests as a measurement instrument. To see the results of students' mathematics learning, 30 students were given a follow-up exam after completing the mathematics learning process, either using problem-based strategies, expository strategies, or problem-based and contextual strategies, visual learning styles, kinesthetic learning styles.

The students' mathematics learning outcomes use problem-based strategies and a visual learning style. shows a maximum score of 100, minimum score of 87, mean value of 92.58, mode of 87.00, median of 91.50, variance of 29.35, and standard deviation of 5.41. Based on this average value, it can be identified that 6 people or 50.00% of students achieved the average score of learning outcomes, 3 people or 25.00% were below the average score of learning outcomes, and 3 people or 25.00 % is above the average learning outcome score.

Furthermore, the mathematics learning results of students using problem-based strategies and having a kinesthetic learning style show a maximum score of 97, a minimum score of 83, an average value of 90.00, a mode of 87.00, a median of 90.00, a variance of 20.83, and a standard deviation. 4.56. From this average value, it can be identified that 4 people or 30.77% of students achieved the average score of learning outcomes, 3 people or 23.08% were below the average score of learning outcomes, and 6 people or 46.15 % is above the average learning outcome score.

The learning outcomes of students who use problem-based strategies and have an auditory learning style show a maximum score of 87, a minimum score of 77, an average value of 82.00, a mode of 83.00, a median of 83.00, a variance of 14.00, and a standard deviation. 3.74. From this average value, it can be identified that 1 person or 20.00% of students achieved the average learning outcome score, 1 person or 20.00% was below the average learning outcome score, and 3 people or 60.00 % is above the average learning outcome score.

Meanwhile, the learning outcomes of students using expository strategies and having a visual learning style show a maximum score of 100, a minimum score of 87, an average value of 91.89, a mode of 93.00, a median of 93.00, a variance of 13.86, and a standard deviation of 3 .72. From this average value, it can be identified that 6 people or 50.00% of students achieved the average score of learning outcomes, 3 people or 25.00% were below the average score of learning outcomes, and 3 people or 20.00 % is above the average learning outcome score.

Then the Mathematics learning results of students with a kinesthetic learning style and using a problem-based strategy show a maximum score of 97, a minimum score of 73, an average value of 83.06, a mode of 80.00, a median of 83.00, a variance of 43.26, and a standard deviation. 6.57. From this average value, it can be identified that 4 people or 30.77% of students achieved the average score of learning outcomes, 3 people or 23.08%

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were below the average score of learning outcomes, and 6 people or 46.15 % is above the average learning outcome score.

Meanwhile, based on the data collected, the Mathematics learning results of students with an auditory learning style who were taught using expository strategies showed that the maximum score obtained was 77, the minimum score was 67, with an average score of 71.60. The mode is located at a score of 67, the median is at 70, and the variance is 25.80, with a standard deviation of 5.07. From the average value, it is known that 2 people or 40.00% of students are at the average learning outcomes score, 1 person or 20.00% is below the average learning outcomes score, and 2 people or 40.00 % is above the average learning outcome score.

Discussion

In this research, there were findings that the learning outcomes of students who applied problem-based learning strategies showed better performance compared to the learning outcomes of students who were taught using expository learning strategies. This is influenced because problem-based learning strategies tend to involve students in more interactive and participatory activities. Students not only receive information passively, but they are also challenged to find solutions to the problems given. This can improve students' understanding of concepts and analytical skills. The higher mean posttest score in the group of students who received problem-based learning indicates that this strategy may be more effective in improving understanding and mastery of Mathematics material. Furthermore, teachers and educational policy makers can consider integrating more elements of problem-based learning in the Mathematics teaching process to increase learning effectiveness.

The results of data analysis confirm that there are differences in student learning outcomes when they are taught with two different learning strategies, namely problem-based and expository. Some students may be more effective at understanding learning material through pictures or diagrams, while others may prefer written text or an auditive approach. Learning styles influence the way individuals remember information. Some people may be more inclined to retain information through practical experience or physical activity, while others may prefer to visualize the concepts. Problem-based learning strategies encourage active involvement of students in solving real-world problems and situations. Students are expected to find their own solutions, design strategies, and actively participate in learning. The results of ANOVA calculations on the posttest scores of the problem-based learning strategy and expository learning strategy groups show a sig value of 0.003 with the condition sig = 0.05. it can be interpreted that there are differences in student learning styles when using problem-based learning strategies compared to the learning styles of students who use expository learning strategies.

In this research, students' abilities were grouped based on learning styles, namely high, medium and low. This grouping was carried out to evaluate the relationship between student learning styles and learning factors. The analysis process using ANOVA on the post-test scores between the problem-based learning strategy group and the expository

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learning strategy group produced a significance value (sig) of 0.036 with a significance limit of α=0.05. These results indicate that grouping students based on learning styles has a significant influence on student learning outcomes. The interactions that occur show that the effectiveness of learning strategies, both problem-based and expository, can be influenced by students' learning styles. In other words, the effects of a learning strategy may vary depending on the student's learning style. These findings can be an important basis for designing more personalized learning approaches, according to students' learning characteristics and preferences.

CONCLUSION

Based on the results of the discussions that have been carried out, the following conclusions can be put forward. There are differences in the learning outcomes of students who are taught using problem-based learning strategies with expository learning in class V of SD Negeri Datuk Limapuluh District, Batubara Regency. There are differences in learning outcomes for students who have visual, kinesthetic and auditory learning styles in class V of SD Negeri Datuk Limapuluh District, Batubara Regency. There is interaction between strategies p learning and learning styles on student learning outcomes. Based on the results of the ANOVA test, the value obtained was sig=0.0 36 <sig.0.05, thus proving that there was an interaction between learning strategies and learning styles on student learning outcomes.

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