THE RELATIONSHIP BETWEEN LEARNING MOTIVATION AND MATHEMATICS PROBLEM-SOLVING ABILITY OF SEVENTH-GRADE STUDENTS AT SMP NEGERI 1 SUSUA

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Abstract

The aim of the research is to determine the relationship between learning motivation and the mathematical problem-solving ability of seventh-grade students at SMPN 1 Susua. The research approach is quantitative with a correlational research type. The population of this study consists of seventh-grade students at SMP Negeri 1 Susua, totaling 20 students, and the sampling technique used is total sampling. The instruments used are a mathematical problem-solving ability test and a questionnaire. Based on the research results, the value of t_{count} = 2.485813, was obtained, and to determine the t_{table} value with a 5% significance level, the value of r_{table}= 2.100922, was obtained. Therefore, since t_{count} = 2.485813 > t_{table} = 2.100922, it can be concluded that there is a relationship between motivation and mathematical problem-solving ability of seventh-grade students at SMP Negeri 1 Susua, with the level of correlation falling into the moderate category. Therefore, the researcher suggests that (1) students should have good learning motivation to achieve good mathematical problem-solving ability, (2) teachers should further develop good learning motivation to improve students' mathematical problem-solving ability, and (3) this study should be used as a comparison for future researchers and as a reference.

Keywords: Learning Motivation; Mathematical Problem-Solving Ability; Integer

Abstrak

Tujuan penelitian adalah untuk mengetahui hubungan motivasi belajar terhadap kemampuan pemecahan masalah matematika siswa kelas VII SMPN 1 susua. Pendekatan penelitian ini adalah kuantitatif dengan jenis penelitian korelasi. Populasi dalam penelitian ini adalah siswa kelas VII SMP Negeri 1 Susua yang berjumlah 20 siswa dan teknik pengambilan sampel menggunakan total *sampling*. Instrumen yang digunakan yaitu tes kemampuan pemecahan masalah matematika dan angket (kuesioner). Berdasarkan hasil penelitian menunjukan bahwa diperoleh nilai t_{hitung} = 2,485813 dan untuk menentukan harga t_{tabel} dengan taraf signifikan 5% diperoleh nilai r_{tabel} = 2,100922, sehingga diporeleh t_{hitung} = 2,485813 > t_{tabel} = 2,100922 karena t_{hitung} lebih besar dari pada t_{tabel} maka dapat disimpulkan bahwa ada hubungan motivasi terhadap kemampuan pemecahan masalah matematika siswa kelas VII SMP Negeri 1 Susua dengan tingkat korelasi berada pada kategori sedang. Oleh karena itu peneliti menyarankan (1) hendaknya siswa memiliki motivasi belajar yang baik supaya memperoleh kemampuan

pemecahan masalah matematika baik (2) hendaknya guru dapat mengembangkan lebih lanjut tentang motivasi belajar yang baik supaya memperoleh kemampuan pemecahan masalah matematika yang baik (3) hendaknya penelitian ini menjadi bahan perbandingan kepada peneliti selanjutnya dan menjadikan ini sebagai referensi.

A. Introduction

Education is a conscious and planned effort to create a learning atmosphere and a learning process so that students actively develop their potential to possess spiritual strength, self-control, personality, intelligence, noble character, and skills necessary for themselves and society (Law No. 20 of 2003). Education can also be interpreted as a systematic effort to create a learning situation and process, enabling students to actively enhance their potential to achieve a better standard of living. Thus, it can be concluded that education plays a crucial role in shaping students' personalities so they possess intelligence and skills. We can interpret that education is a planned effort to nurture and develop one's potential, personality, and intelligence both physically and spiritually.

One educational institution that provides learning, skill development, and educational values is the school. Schools serve as a platform for the development of every element involved in teaching and learning activities, educating, and developing students' potential to become useful members of society. One subject that students learn at school is mathematics.

Mathematics is one of the subjects taught in schools, from elementary school to junior high and high school. Mathematics is full of concepts and principles where solving mathematical problems requires the ability to understand these problems, construct them into mathematical ideas, and resolve these ideas according to mathematical concepts and principles. Moreover, mathematics is a very important subject; therefore, both students' and teachers' roles are essential in achieving the goals of the learning process.

The success of the learning process is measured by the achievement of learning objectives. The effectiveness of the learning process is also closely related to students' abilities to solve mathematical problems. However, students' success in solving mathematical problems varies. Some students face learning difficulties, which affects their problem-solving abilities. This is presumed to stem from a lack of motivation to learn, resulting in difficulties when facing complex mathematical problems. Consequently, students may struggle to solve them. When addressing mathematical problems, students are expected to expand their mathematical ideas to enhance their problem-solving capabilities.

The ability to solve mathematical problems is one of the key objectives of

studying mathematics, enabling students to understand problems, devise strategies to solve them, and interpret the solutions. Students' problem-solving abilities can be assessed based on their approach to solving mathematical problems, including their understanding of the problem, planning for resolution, executing the plan, and checking the solutions. This emphasizes that students must possess problem-solving skills to improve their quality in learning mathematics.

Several factors influence problem-solving skills, one of which is learning motivation. Motivation is an internal drive that encourages individuals to act in specific ways to achieve planned goals. Here, motivation acts as a psychological tool that serves as the impetus or push to engage in activities. It encourages individuals to strive for good learning outcomes. The essence of learning motivation is the internal and external drives experienced by students while learning, aiming to induce behavioral change.

Moreover, students' learning motivation significantly impacts the continuity and success of the learning process. Thus, it can be stated that better learning outcomes are attainable when a student possesses strong intrinsic motivation. Therefore, every student should have learning motivation. This suggests that the presence of learning motivation in students is expected to positively influence their mathematics problem-solving abilities.

Based on preliminary studies obtained from interviews with teachers at SMPN 1 Susua, it was found that during the learning process, students' learning motivation was lacking because they lacked desire or drive to study. Some students were also disinclined to learn, especially regarding their mathematics problem-solving abilities. The teacher noted that only a few students contributed actively during lessons. According to the interview results, the teacher mentioned that there were many changes observed during the learning process, particularly regarding learning motivation. Teachers face difficulties, especially when students feel bored, prompting the need to find ways to engage students and alleviate their boredom. Another challenge is that students show little enthusiasm for mathematics learning, claiming they do not like it and demonstrating a lack of willingness and concentration during lessons. This indicates that a lack of student motivation can affect learning activities and result in increasingly lower mathematics problem-solving abilities.

To address these issues regarding students' learning motivation, teachers can create a conducive, active, efficient, and enjoyable classroom atmosphere, thereby fostering motivation within students, using appropriate learning approaches to realize educational objectives effectively. In this context, the teacher's role in providing engaging teaching methods during learning activities will stimulate students' motivation, making them more diligent and

active learners. If teachers effectively implement good learning strategies, students may perceive mathematics learning as easier and more enjoyable.

B. Research Methodology

1 Research Approach and Type of Study

This study employs a quantitative approach based on statistical information. This research approach addresses research problems that require precise measurement of the variables of the studied object to produce conclusions that can be generalized, irrespective of time, place, and situation. According to Sugiyono (2016), quantitative research methods can be defined as research methods grounded in positivist philosophy, used to study a specific population or sample. The sampling technique is generally conducted randomly, data collection uses research instruments, and data analysis is quantitative or statistical, aiming to test established hypotheses. The type of research used in this study is correlational research. According to Arikunto (2014:313), "Correlational research aims to find out whether a relationship exists and, if so, how strong that relationship is and whether it is significant."

2 Population and Sample

The population for this research consists of all seventh-grade students at SMP Negeri 1 Susua. A sample is drawn from this population using a random sampling technique to ensure that every student has an equal opportunity to be included in the study. This method enhances the representativeness of the sample, which is essential for the validity of the research findings. The total number of students in the sample is 20, which is deemed sufficient to achieve the objectives of the study while allowing for statistical analysis of the results.

a. Population

According to Sugiyono (2018:117), "Population is the generalization area that consists of objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and subsequently draw conclusions." The population used in this study consists of seventh-grade students at SMP Negeri 1 Susua, totaling 20 students.

b. Sample

A sample is a portion of the population whose characteristics are to be studied. Sugiyono (2018:118) states, "A sample is part of the quantity and characteristics possessed by the population." To determine a sample for research, a sampling technique is necessary, and the type of sampling used in this study is total sampling. Total sampling is a sampling technique where the number of samples is equal to the population size (Sugiyono, 2017). Therefore, the sample used in this study consists of the seventh-grade students at SMP Negeri 1 Susua.

3 Place and Time of Research

The research was conducted at SMP Negeri 1 Susua located in Sifalogo Village, Susua District, Nias Selatan Regency, North Sumatra Province. The study took place from April 21 to April 28 during the second semester of the 2023/2024 academic year.

4   Operational Definitions

Operational definitions are created to facilitate data collection, avoid differing interpretations, and limit the scope of variables (Pasaribu et al., 2022:67). The operational definitions in this study are as follows:

1) **Learning Motivation**: This is an inner drive within an individual characterized by the desire and effort to achieve predetermined learning objectives.

2) **Problem-Solving Ability**: This refers to the ability to identify and formulate solutions to mathematical problems using one's own strategies. Problem-solving ability includes several indicators: understanding the problem, planning the solution, executing the plan, and reviewing the solution.

5   Research Instruments

Research instruments are tools or facilities used by researchers to collect data, making the process easier and yielding better results, meaning that the results can be more complete, systematic, and easy to analyze. The research instruments used in this study include:

1) Test

The purpose of this test is to measure mastery of mathematical problem-solving abilities in completing problems. The test used is an essay-type test focused on integer operations, consisting of 5 questions.

2) Questionnaire

In developing a research instrument, it is essential to refer to established theories, as these theories provide a foundation for addressing the issues at hand. According to Sugiyono (2013:147), a research instrument is a tool used to measure both natural and social phenomena being observed. The instrument used in this study is a questionnaire designed to collect data regarding students' motivation in mathematical problem-solving. The development of this instrument is based on a theoretical framework structured into a series of questions. The questionnaire utilized is a closed questionnaire, which includes answer choices, allowing students to simply select their responses.

6   Data Collection Techniques

Data collection techniques are fundamental steps in research, as one of the most critical indicators of a study is the research data itself. The data collection techniques employed in this study involve several steps that the researcher must take to obtain the necessary research data:

1) **Questionnaire and Mathematical Problem-Solving Test**: The questionnaires and tests on mathematical problem-solving that have been developed by the researcher must be based on the established guidelines and question frameworks.

2) **Instructions for Students**: Before students fill out the questionnaires and the mathematical problem-solving test, the researcher provides instructions regarding the steps for completing the questionnaire and the test.

3) **Encouragement for Honest Responses**: During the completion of the questionnaire and the mathematical

problem-solving test, the researcher encourages students to respond truthfully and to solve the problems accurately.

4) **Reminder for Student Identification**: Ten minutes before the end of the questionnaire and test completion time, the researcher reminds students not to forget to fill in their identification columns.

5) **Collection of Instruments**: After the time is up, the questionnaires and tests on mathematical problem-solving are collected and will then be processed by the researcher using data analysis techniques.

7 Data Analysis Techniques

1) **Data Description**

The data obtained from the research location will be processed as material for the study. In quantitative research, the data analysis techniques used are clearly aimed at answering the research questions or testing the hypotheses formulated in the proposal. Since the data is quantitative, the analysis will employ available statistical methods (Sugiyono, 2009:243).

2) **Processing the Questionnaire**

Once the data on students' motivation for learning mathematics has been collected through the questionnaire, an analysis is conducted to describe this motivation. First, the scores obtained are converted to a scale of 100. The systematic conversion can be performed using the following formula:

$$P = \frac{f}{N} \; x \; 100\%$$

Explanation:

P: Percentage

f: Frequency for which the percentage is being calculated

N: Number of cases (total frequency of individuals)

The classification of the success levels can be determined as follows:

Table 1: Categories of Learning Motivation

Category	Score Interval
Very High (VH)	81-100
High (H)	61-80
Moderate (M)	41-60
Low (L)	21-40
Very Low (VL)	1-20

Research: Riduan (2003: 41)

$$\text{Score} = \frac{\text{Total Correct Answers}}{\text{Total Questions}} \; x100$$

Criteria for Action Success

The criteria for evaluating the level of success can be categorized as follows:

81 - 100: Good

61 - 80: Satisfactory

41 - 60: Low

0 - 40: Very Low

c. Correlation Coefficient

To determine the relationship between two variables, specifically the relationship between learning motivation and mathematical problem-solving ability, the product-moment correlation formula is used, as follows (Arikunto, 2012:87):

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{\{N \sum X^2 - (\sum X)^2\} - \{N \sum Y^2 - (\sum Y)^2\}}}$$

Where:

r_{xy} = Correlation Coefficient

X = Value Of Variable X (Learning Motivation)

Y = Value Of Variable Y (Problem-Solving Ability)

N = Number Of Respondentsumlah Responden

To interpret the magnitude of the correlation coefficient, the following classifications are provided (Sugiyono, 2017:184):

Interpretation of the Correlation Coefficient:

0,00-0,199 = Very weak correlation

0,20-0,399 = Weak correlation

0,40-0,599 = Moderate correlation

0,60-0,799 = Strong correlation

0,80-1,00= Very strong correlation

Coefficient of Determination

To determine the percentage contribution of variable X (Learning Motivation) to variable Y (Students' Problem-Solving Ability in Mathematics), the calculation is done using the following formula (Subana et al., 2000:145):

$$KD = r^2 \times 100\%$$

Where:

KD = Coefficient of Determination

r = Correlation Coefficient

Hypothesis Testing

Hypothesis testing is conducted to determine whether the research variables can accept their hypotheses. According to Sugiyono (2012:258), "the criterion is that if the calculated r$_{calculate}$ is greater than the table r$_{table}$, then Ha is accepted." In other words, if t$_{Calculate}$>t$_{tabel}$ at a significance level

of 5%, then Ha is accepted and Ho is rejected.

To determine whether the hypothesis is rejected or accepted, statistical testing is performed using the following formula from Sugiyono (2012:259):

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}, \text{ dengan dk = n – 2}$$

keterangan

t : $t_{calculate}$

r : $r_{calkulate}$

dk : *degree of freedom (df)*

n : sample size (number of respondents)

2 : Constant Number

1 : Constant Number

C. Results and Discussion

This study was conducted to determine the relationship between learning motivation and the problem-solving abilities in mathematics of seventh-grade students at SMP Negeri 1 Susua, with a total of 20 students.

Based on the research findings, the average achievement level of students in the learning motivation variable was 71, while the average achievement level in the mathematics problem-solving ability variable was 72.75. This indicates that learning motivation and mathematics problem-solving ability are positively correlated, meaning that higher learning motivation corresponds to higher mathematics problem-solving ability among students.

From the hypothesis testing calculations, the obtained t-value was

2.485813. To determine the critical t-value at a significance level of 5%, the critical value was found to be 2.100922. Thus, we have t = 2.485813 > t-table = 2.100922. Since the t-value is greater than the critical t-value, we reject the null hypothesis (H0) and accept the alternative hypothesis (Ha). This suggests that there is a relationship between learning motivation and the mathematics problem-solving abilities of students. The correlation level falls into the moderate category.

Furthermore, the correlation coefficient was found to be rxy = 0.5039, and the coefficient of determination indicated that learning motivation contributed 25.39% to the mathematics problem-solving ability, while 74.61% was influenced by other factors such as interest in learning, learning styles, facilities and infrastructure, and others.

Learning motivation encompasses the driving forces within students that initiate learning activities and provide direction towards achieving goals. As stated by Djamarah (2012:50), "Motivation is a drive that moves someone to engage in an activity." Therefore, motivation is crucial in optimizing learning outcomes, as learning without motivation is often challenging to succeed. This aligns with Me Donald in Kompri (2015:231), who noted that motivation significantly determines the success or failure of students' learning activities.

To achieve optimal mathematics problem-solving abilities, the motivation of the subject teacher is also essential. This is consistent with Sardiman (2011:75), who stated that learning outcomes will be optimal when there is appropriate motivation. Consequently, various teaching methods should be employed by teachers to cultivate students' motivation in enjoying mathematics.

A relevant study related to this research is by Isnaini Wijaya (2017), titled "The Relationship between Learning Motivation and Student Achievement in Class V SD Negeri 1 Waringinsari Barat, Pringsewu Regency." In that study, the t-value was found to be 0.469 ≥ 0.349, indicating a relationship between learning motivation and student achievement. This underscores that motivation plays a significant role not only in enhancing mathematics problem-solving abilities but also in influencing student learning outcomes.

The analysis of this research indicates a relationship between learning motivation and the problem-solving abilities in mathematics of seventh-grade students at SMP Negeri 1 Susua. The findings demonstrate that students with high learning motivation achieve better results. This aligns with Palardi's opinion cited in Pujilestari (2016:40), which states that students with high motivation seldom fall behind in their studies and make very few errors in their learning.

D. Conclusion

Based on the results of the research and discussion, it can be concluded that there is a relationship between learning

motivation and the problem-solving abilities of seventh-grade students at SMP Negeri 1 Susua. The hypothesis test yielded a t-value of 2.485813, and to determine the critical t-value at a significance level of 5%, the critical value obtained is 2.100922. Therefore, since the t-value (2.485813) is greater than the critical t-value (2.100922), we reject the null hypothesis (H0) and accept the alternative hypothesis (Ha). This indicates a positive relationship between the two variables. The coefficient of determination (KD) was found to be 25.39%, suggesting that 74.61% of the variation is influenced by other variables.

Based on the findings, discussion, and conclusions of this research, the researcher acknowledges that this study has significant limitations. Therefore, the researcher offers several suggestions as input for students, teachers, and future researchers:

1 **For Students**

It is hoped that students will understand the importance of motivation and problem-solving skills in mathematics during their learning activities.

2 **For Teachers**

Teachers are encouraged to develop students' learning motivation and problem-solving abilities in mathematics to ensure that the learning process runs effectively, especially in mathematics subjects.

3 **For Researchers**

This study is expected to serve as a comparative reference for future researchers.

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