SELF-EFFICACY OF JUNIOR HIGH SCHOOL STUDENTS IN MATHEMATIC PROBLEM SOLVING

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Abstract: *This study aims to describe the self-efficacy of junior high school students in Medan City and Deli Serdang Regency, North Sumatra in solving mathematical problems in social arithmetic material. This research includes survey research with quantitative and qualitative approaches. The research subjects were 67 junior high school students in Medan City and Deli Serdang Regency, North Sumatra who came from two schools with the category of one public school and one private school. The instrument used is a self-efficacy questionnaire consisting of 27 statement items based on self-efficacy indicators that will be filled out by students, and interview guidelines. The results showed that the average self-efficacy of private junior high school students in Medan City and Deli Serdang Regency, North Sumatra as a whole of 67 students was in the high category, which was 90.24. In general, students have a high tendency of self-efficacy. For example, having confidence or confidence in the abilities possessed in carrying out and completing the tasks at hand so that they are able to overcome obstacles and achieve the expected goals, so it can be concluded that students who have high efficacy abilities will have an impact on their learning achievement and students' mathematical problem solving. getting better.*

Keywords: Self-Efficacy; Middle school students; Mathematical Problem Solving

Abstrak: Penelitian ini bertujuan untuk mendeskripsikan self-efficacy siswa SMP di Kota Medan dan Kabupaten Deli Serdang, Sumatera Utara dalam memecahkan masalah matematika pada materi aritmatika sosial. Dalam penelitian ini termasuk penelitian survei dengan pendekatan kuantitatif dan kualitatif. Subjek penelitian adalah 67 siswa SMP di Kota Medan dan Kabupaten Deli Serdang, Sumatera Utara yang berasal dari dua sekolah dengan kategori satu sekolah negeri dan satu sekolah swasta. Instrumen yang digunakan berupa angket self-efficacy yang terdiri dari 27 item pernyataan berdasarkan indikator self-efficacy yang akan diisi oleh siswa, dan pedoman wawancara. Hasil penelitian menunjukkan bahwa rata-rata self- efficacy siswa SMP swasta di Kota Medan dan Kabupaten Deli Serdang, Sumatera Utara secara keseluruhan dari 67 siswa berada dalam kategori tinggi yaitu sebesar 90,24. Secara umum, siswa memiliki kecenderungan self-effficacy yang tinggi. Misalnya memiliki keyakinan atau kepercayaan diri terhadap kemampuan yang dimiliki dalam

melaksanakan dan menyelesaikan tugas-tugas yang dihadapi sehingga mampu mengatasi rintangan dan mencapai tujuan yang diharapkan, sehingga dapat disimpulkan bahwa siswa yang memiliki kemampuan efficacy yang tinggi akan berdampak terhadap prestasi belajarnya dan pemecahan masalah matematis siswa semakin lebih baik.

Kata Kunci : Self-Efficacy; Siswa SMP; Pemecahan Masalah Matematis

INTRODUCTION

In general, the purpose of providing education is to develop and foster the potential of human resources through various teaching activities held at all levels of education and at the elementary, secondary, and tertiary levels (Dani & Joan, 2004; Siregar & Prabawanto, 2021). Efforts to improve the quality of education have been carried out by the government, including by equipping facilities and infrastructure, improving the quality of teaching staff, as well as improving the curriculum that emphasizes the development of life skills through the achievement of student competencies to be able to adapt and succeed in the future come (Nghi & London, 2010).

According to the Ministry of National Education (2006), one of the goals of learning mathematics at the secondary school level is to guide students to have problem solving skills (Cai & Nie, 2007). Furthermore, NCTM (2000) states that in the process of learning mathematics, schools have been required to involve solving mathematical problems as an inseparable part (Kelly, 2006). Problem solving is also the core of mathematical activity and one of the competencies that are needed in the 21st century (Larson & Miller, 2012). These skills are needed in everyday life, including in the work environment (Amabile et al., 2004). Therefore, it becomes very relevant that every individual needs problem solving to solve increasingly complex problems (Fikes & Nilsson, 1971).

Problem solving is an attempt to find a solution to a problem whose solution cannot be directly found (Sweller & Cooper, 2009). Therefore, some researchers emphasize that students' problem-solving abilities are important to be studied more deeply (Brand-Gruwel et al., 2005). Moreover, problem solving is a process in which a person uses the knowledge, skills, and understanding gained to meet the demands of an unknown situation (Heller et al., 1998). The problem solving process involves

several stages, namely analyzing, interpreting, reasoning, predicting, evaluating and contemplating (Ge & Land, 2004).

Problem solving is one of the main aspects of the mathematics curriculum which is not only applied in Indonesia but also throughout the world (Stacey, 2011). Unfortunately, the results of the study show that students have difficulty in solving mathematical problems (Schoenfeld, 2018). The vision of mathematics education in Indonesia is to understand mathematical concepts and ideas which are then applied to solving routine and non-routine problems through the development of reasoning, communication, and connections within and outside mathematics (Lubis et al., 2021).

Surprisingly, students remained weak in problem solving and viewed mathematics as one of the difficult and boring subjects to learn and deal with with various topics (Putnam et al., 2015). The goal of developing students' problem solving skills can be achieved if teachers consider more aspects of teaching and learning (Hiebert et al., 2016). Mathematics education should assist and guide students in understanding mathematical concepts, processes and techniques, as well as develop the ability to solve various mathematical problems and most importantly, contribute to life decisions (Blum & Niss, 1991).

In improving the quality of education in addition to cognitive aspects, affective or psychological aspects are also needed, including student self-efficacy (Siregar et al., 2020; Siregar & Prabawanto, 2020). Teachers are required to play a role to foster self-efficacy or student self-efficacy. In an activity, the emotional state is one that will affect self-efficacy in that activity. Strong emotions, fear, anxiety, stress can reduce self-efficacy. However, if there is an increase in emotion (which is not excessive) it can increase self-efficacy. The higher a person's self-efficacy, according to Bandura (1994), the better a person's performance. People act on their self-efficacy and measure their self-worth by their performance. In general, success in performance increases confidence in personal efficacy; Repeated performance failure will reduce self-efficacy (Zulkosky, 2009).

Some of the obstacles and difficulties in human endeavor serve as a useful goal in teaching that success usually requires persistent effort (Bandura, 2016). Once people are convinced that they have what it takes to succeed, they will be able to endure the worst of things and bounce back quickly when they fail.

Self-efficacy determines when a person feels, thinks, motivates himself and behaves. Such beliefs produce different effects through four main processes. The four sources of self-efficacy can come from: (a) individual experience (mastery experience), (b) experience of others (vicarious learning), (c) Verbal persuasion (verbal persuasion), (d) psychological and emotional conditions (psychological states) (Bandura, 1977, 1982, 2010; Bandura & Watts, 1996). The sources of self-efficacy can also be said as a means to shape one's self-efficacy.

Most actions are initially set in the mind. Individuals' beliefs about their form of efficacy shape the types of anticipatory scenarios they construct and practice. Those who have a high sense of efficacy, imagine a success scenario that provides positive guidance and support for the implementation of the achievement. Those who doubt their efficacy, imagine failure scenarios and fixate on things that go wrong. To achieve good results will be difficult if there is self-doubt. The possibility of a person to predict events and make strategies to control things that can affect his life are the main functions of the mind. This ability requires effective knowledge information, which contains many things that are unclear and uncertain. In studying predictive and regulatory rules, people must cultivate the knowledge they have to make choices, consider and integrate predictive factors, to test and improve judgments of the outcomes of their actions and the risks, both long and short term, and to remember the factors they have tested and how well they have performed.

Self-efficacy operates within each type of cognitive motivation. Self-efficacy influences causal attributions. Someone who perceives himself as having high efficacy interprets failure as a lack of effort, while those who perceive themselves as someone who lacks efficacy interpret their failure as being caused by a lack of ability. These causal attributions affect motivation, results achieved and affective reactions mainly through beliefs of self-efficacy. Self-efficacy plays a role in motivating in several ways. They set goals that people have set for themselves; how much effort they have put into it; how long they persistently endured adversity; and perseverance to overcome failure. When faced with obstacles and failures someone who has self-doubt about their abilities lowers their efforts or gives up easily. Those who have strong belief in their abilities show greater effort when they fail to master challenges. Strong persistence plays a role in achievement.

Through preliminary observations made, it can be seen that students' self-efficacy, especially in mathematics, is still not optimal. For several reasons, including the social, geographical, cultural environment, stages of student development, students' initial abilities, interests, family background, and so on. So in fact the ability of students' self-efficacy is still relatively low. This unsatisfactory reality is caused by many factors, including those from within students, families and the environment. In the school environment, some teachers are still less creative and innovative in growing student efficacy. This can be seen from the lack of meaningful learning activities carried out by some teachers.

Students' beliefs and perceptions about the subject being studied are important and are thought to have an effect on student achievement in learning. Students differ from one another. Students' individual differences can be in the form of cognitive, affective, psychological differences, and so on. Bandura (Schunk, 2012) states that "self-efficacy (efficacy expectation) refers to personal beliefs about one's capabilities to learn or perform action at designated levels". Self-efficacy is a person's belief in one's ability to do something, and Schunk stated that it is not the same as knowing what to do. Self-efficacy refers to a person's view of one's own ability to perform a certain action, while outcome expectation refers more to beliefs about the results that will be obtained from the action.

The low self-efficacy of students in mathematics is indicated by the number of students who do not want to try more to do math problems, and tend to give up quickly when they get difficult assignments. In fact, according to Schunk (2012) and supported by the results of research by Hamdi & Abadi (2014), self-efficacy has a close effect on learning achievement. Belief (efficacy) is the main basis of an action. Someone who has confidence in himself to take an action is called self-efficacy. Belief in the ability to complete a particular task is known as self-efficacy (Sniehotta et al., 2007).

According to Bandura (2009, p. 2) self-efficacy is a person's perceived belief about an ability to organize and complete the actions needed to manage future situations. In addition, it is also explained that self-efficacy affects how a person thinks, feels and motivates themselves and how they act. According to Woolfolk (2009, p. 284) that self-efficacy arises when students tackle challenging and

meaningful tasks with the support they need in order to be successful. In addition, self-efficacy appears by observing the success of students who are doing the same task. The feedback provided by the teacher accurately and encouragingly can help the growth of self-efficacy (Aparicio-Flores et al., 2020).

In this study, what is meant by student self-efficacy towards mathematics is students' confidence in their ability to solve problems, complete tasks without comparing with the abilities of others so that they can achieve success in learning mathematics achievement accompanied by a sense of confidence in the efforts made, the choices made have been determined, and have persistence. The indicators of self-efficacy observed included self-confidence in their own abilities, feelings of being able to solve math problems, feelings of being able to carry out tasks, feelings of being able to achieve learning achievement targets, and self-confidence in the efforts made. This is in accordance with the statement that self-efficacy is important in solving mathematical problems (Mufida et al., 2018; Peranginangin et al., 2019; Zhou et al., 2019). However, research related to self-efficacy in solving mathematical problems still needs to be studied more deeply and has not focused on seventh grade junior high school students. Therefore, this study tries to examine more deeply related to student self-efficacy in solving mathematical problems based on phenomena that occur in class VII SMP.

Based on this description, the question in this study is how is the self-efficacy of junior high school students in solving mathematical problems?. So the purpose of this study was to describe the self-efficacy of junior high school students in solving math problems in class VII. The hope of this research is to contribute in learning mathematics and provide variations of existing tests, especially those related to mathematics problem solving tests and the level of self-efficacy of these students.

RESEARCH METHOD

This research is a survey research with quantitative and qualitative approaches. The research was conducted in Medan City and Deli Serdang Regency, North Sumatra. Data collection was carried out at 2 grade VII junior high schools, namely Al-Ulum Private Middle School Medan, State Junior High School 2 One Roof Batang Kuis, Deli Serdang Regency.

The population of this study were seventh grade students of SMP in Medan City, North Sumatra. There are 398 junior high schools in Medan City and 329 junior high schools in Deli Serdang Regency, because the population is very large, a sample selection method for each school is carried out that can represent the population. In this study there were 2 schools selected, namely 1 private school and 1 public school. From the two schools, there are 67 students who will be given a self-efficacy questionnaire test in solving math problems.

The first stage in this research, which is to provide students' self-efficacy questionnaires in solving mathematical problems. The indicators of self-efficacy in mathematical solving are as follows:

Table 1. The indicators of self-efficacy in mathematical solving

Variable	Sub Variable	Indicator	No. Items	Amount
SELF EFFICACY	**Dimension (Levels)**	Students are able to solve problems related to the level of difficulty of the task	1, 2, 3, 4, 5, 6	6
		Students work on tasks that they feel capable of carrying out and avoid tasks that are beyond their capabilities	7,8,9,10	4
	Strenght	Students' confidence in their ability to achieve success in every task	11,12,13	3
		Strong expectations of self-ability that encourage students to achieve goals and success	14, 15,16	3
	Generality	Confidence in students' abilities depends on understanding their abilities	17,18,19, 20, 21, 22, 23	6
		Students are able to understand that their abilities are limited to certain activities and situations that vary.	23, 24,25,26,27	5
AMOUNT				**27**

Then the second stage of research was carried out, namely in-depth interviews with the research sample units that had been determined after the first stage was completed and the results of student questionnaires were examined.

The data obtained are students' self-efficacy in solving mathematical problems. The instrument used to determine student self-efficacy is a student self-efficacy questionnaire. The data collection technique in this study was to validate and estimate the reliability of the test instrument. Data analysis was carried out during and after data collection so that the data obtained were arranged systematically and more easily interpreted according to the problem formulation. The steps of data analysis and interpretation are carried out in stages, namely first, collecting and formulating all data obtained from the field. This activity was carried out by: (1) examining the results of students' self-efficacy questionnaires in their confidence in solving problems and beliefs in mathematics; (2) analyze the results of the questionnaire based on the established indicators; (3) categorize students' self-efficacy based on very high, high, medium, low, and very low criteria.

Next, categorize draw conclusions. At this stage, conclusions are drawn based on an analysis of the data that has been collected, either through questionnaires or interviews. These conclusions include: categorizing the self-efficacy of junior high school students in solving math problems.

RESULTS AND DISCUSSION

In this study, researchers collected information through student self-efficacy questionnaires and the results of interviews about solving mathematical problems given. Before conducting interviews, students' mathematical self-efficacy was first measured, namely by using a questionnaire. The questionnaire consists of 27 items with each item having a score range of 0 to 5, so that the total self-efficacy score has a range of 0 to 135. The data for measuring student self-efficacy for each school is presented in Table 2.

Based on the results of the analysis in Table 2, the average self-efficacy scores of students in 2 schools, namely SMP A and SMP B are not too much different. The difference is only 4.91 adrift.

The frequency and percentage of many students on each student's mathematical self-efficacy criteria were calculated based on a predetermined score range. The distribution of the frequency and percentage of students' mathematics self-efficacy in 2 junior high schools is presented in Table 3.

Table 3 shows that the self-efficacy scores of students in 2 junior high schools in Medan City and Deli Serdang Regency, namely SMP A and SMP B, are mostly distributed on high criteria. The number of students in SMP A who have self-efficacy on high criteria is 12 (35.29%) of 34 students, 22 (64.71%) students are on high criteria. The number of students in SMP B who have self-efficacy on high criteria is 8 (24.24%) of 33 students, 25 (75.76%) students are in high criteria.

Table 2. Description of Students' Mathematics Self-Efficacy Data in 2 Junior High Schools

Description	SMP A	SMP B
Average	90,14	85,23
Standard Deviation	8,80	6,49
Highest score possible	135	135
Lowest score possible	27	27
The highest score achieved by students	120	104
The lowest score achieved by students	78	79

Table 3. Distribution of Frequency and Percentage of Students' Mathematics Self-Efficacy in 2 Junior High Schools

Score (X)	Criteria	SMP A		SMP B	
		f	%	f	%
95 < X ≤ 127	Very high	12	27,8	8	24,24
74 < X ≤ 95	High	22	64,71	25	75,76
53 < X ≤ 74	Currently	0	0	0	0
32 < X ≤ 53	Low	0	0	0	0
0 < X ≤ 32	Very low	0	0	0	0

Based on data exposure and data analysis, it shows that the average self-efficacy of private junior high school students in Medan City and Deli Serdang Regency, North Sumatra as a whole of 67 students is in the high category, which is 90.24.

Furthermore, the results of the interview show that students who have high self-efficacy also have excellent solving abilities. This is in line with the research results of which states that the higher the self-efficacy of students, the better their mathematical problem solving abilities are students who have high self-efficacy will solve problems with appropriate problem-solving steps (Prabawanto, 2018).

Based on the explanation above, students' high self-efficacy in the learning process will make students more interested in mathematics and will be more responsible in solving mathematical problems. This is in accordance with the observations of researchers during the learning process on social arithmetic material, for students who have high self-efficacy it can be seen that students look enthusiastic, active, and enthusiastic when designing answers to math problem solving questions given even though there are some students who are less enthusiastic for the self-efficacy of students who are silent or resigned to waiting for friends to answer the problem solving questions given. This is caused by several factors, including physiological, emotional, social and experience conditions.

Self efficacy is important for everyone to face a problem at hand. This is reinforced by evidence that self-efficacy greatly affects life. Self-efficacy also greatly affects self-confidence, while self-confidence is one of the important aspects of personality in human life, which is formed through the learning process in its interaction with the environment. Self-confidence is an aspect of human personality that has an important function to actualize human potential (Bénabou & Tirole, 2002).

Research conducted by Belz and Hacket in 1983 (Pajares, 2002) reported that with high self-efficacy, in general a student will find it easier and more successful to surpass the exercises given to him, so that the final result of the learning will be better. reflected in their academic achievement also tends to be higher than students who have lower self-efficacy.

In general, students have a high tendency of self-efficacy. For example, having confidence or confidence in the abilities possessed in carrying out and completing the tasks at hand so that they are able to overcome obstacles and achieve the expected goals, so it can be concluded that students who have high efficacy abilities will have an impact on their learning achievement and students' mathematical problem solving. getting better.

CONCLUSION AND SUGGESTIONS

Based on the information obtained in the study, it can be concluded that the average self-efficacy of private junior high school students in Medan City and Deli Serdang Regency, North Sumatra as a whole of 67 students is in the high category, which is 90.24. Self-efficacy plays an important role in everything, especially for students who are solving math problems. With a high sense of self-efficacy in students, they are expected to be successful in solving mathematical problems. To instill high student self-efficacy, teachers need to create a pleasant learning atmosphere, activate and develop self-confidence and always provide good motivation.

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