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Students' mathematics self-efficacy in learning social arithmetic topic

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ABSTRACT

The issue, the significance of student self-efficacy in the learning process, is what inspired this study. This study set out to identify and characterize students' self-efficacy capacities for studying the social arithmetic topic in light of their unique traits. This research is descriptive research through questionnaire analysis using percentages. A self-efficacy questionnaire plus a questionnaire for students' responses make up the tool used to assess self-efficacy abilities. In this study, the data were collected and evaluated using a Likert attitude scale to determine whether students' self-efficacy in studying the social arithmetic topic had increased. The scale in this self-efficacy contains three components, namely students' assessment of: i) the level of task difficulty (magnitude); ii) the variety of tasks (generality); and iii) the degree of stability in completing a task (strength) in social arithmetic topic. The conclusion obtained in this study related to self-efficacy in mathematics is that it can be seen as a whole in learning social arithmetic topic showing that there are 79.05% of students giving a positive response, meaning that almost all students assess themselves positively when learning social arithmetic topic.

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1. INTRODUCTION

The classroom learning experience has a big impact on education quality. Learning in the classroom is a process that involves interaction with all of the circumstances that are present in a person's environment. This contact will have an impact on behavior changes that are relatively permanent and demonstrate the best learning outcomes for students [1]–[3]. Education and learning in schools are required to foster not only cognitive but also affective aspects as well as students' innate skills, particularly the students' sense of self-efficacy [4]–[8].

Most of students' current learning problems, which are linked to their self-esteem, demonstrate that self-confidence will decide students' future development, so that to achieve an achievement in human life requires self-efficacy [9]. Due to their lack of confidence, pupils frequently struggle to adapt during learning. This can also affect students' future growth and development and low self-efficacy, which could be a sign of learning failure [10], [11].

Self-efficacy is the conviction that one can combine skills and talents to accomplish goals, such as getting good grades [12]–[14]. Today, self-efficacy is crucial [15]. Any issues that arise can be handled and overcome with the aid of self-efficacy [16]. Self-confidence also has an impact on how people cope with stress and anxiety, such as when they fill their time with an activity [17]. Whether the notion is objectively

true or not, Bandura, as cited by Pajares, explicitly links self-efficacy with motivation and action [18]. As a result, action can be predicted by one's perceived self-efficacy (beliefs about their skills), albeit this behavior can occasionally deviate from their real abilities due to the significance of perceived self-efficacy [6], [19], [20]. A person with strong self-efficacy is more likely to engage in particular behaviors where they feel confident in their ability to carry them out successfully [21], [22].

Self-efficacy is needed in many ways, such as when learning mathematics in the classroom. How confident are students in their ability to learn so that they produce good problem solving and successfully respond to inquiries and get good results as well. Self-efficacy can also determine whether the student is achieving or not. While students with low self-efficacy tend to avoid numerous assignments, especially difficult ones, students with high self-efficacy will approach the job with great desire [23]. Self-efficacy produces different behavior between individuals even though they have the same ability. This is such that choices, objectives, problem-solving abilities, and tenacity in trying can all be influenced by self-efficacy [24]. Someone who has low self-efficacy will avoid tasks, especially challenging tasks [25]–[27].

Self-efficacy, which is the conviction that one can control the circumstance and obtain favorable consequences, is a crucial component impacting student accomplishment [28]. A student with poor self-efficacy, for instance, might not want to attempt to study for an exam because he does not think that studying will help him solve the problem [29]. Self-confidence will strengthen the motivation to achieve success so that the spirit in completing a task that is being charged to students. Bandura asserts that there are three elements of efficacy in humans, including: i) Level, where there are variations in self-efficacy felt by each person, maybe as a result of the various pressures faced. Various levels of difficulty or difficulty in achieving optimal performance are represented by task demands; ii) General state (generalization) People may evaluate that they feel confident in a variety of tasks or only in particular roles; iii) The depth of experience affects one's self-efficacy, which is related to one's confidence in one's own talents [30], [31].

Self-efficacy plays a significant role in determining how much self-assurance each person has in their capacity to carry out the learning process and attain the best possible learning outcomes [32]. People with high self-efficacy will manage their learning well and have faith in their ability to complete any challenging activity when studying. They also think they can handle a variety of assignments and make an effort to complete all of them. This will motivate people to be able to organize their learning activities, try to keep an eye on them, and influence their environment to assist those activities [33], [34]. Thus, it is clear that even if a person has a lot of potential, if their self-efficacy is low, it may hinder their ability to learn.

In order to categorize the level of self-efficacy in student learning, it is divided into five categories: very high, high, medium, low, and very low levels of self-efficacy. This is done to assess a student's level of self-efficacy in their learning [35]. If a person feels competent and confident, they are more likely to lead. It will also decide how far he goes, how long he endures if he encounters difficulties, and how adaptable he is in challenging circumstances. A person will put forth more effort, perseverance, and adaptability the higher their sense of self-efficacy. Additionally influencing the thinking and emotional responses is self-efficacy. Low self-efficacy makes a person more likely to give up easily, to be stressed out and sad, and to have a limited view of the optimal course of action. High levels of self-efficacy, meanwhile, can aid a person in maintaining composure while tackling challenging issues or tasks [36].

One of the objectives of learning mathematics is for students to be able to overcome and solve problems they come across in daily life [37]. The social arithmetic topic studied in class VII SMP (first grade of junior high school) is an example of a mathematical topic that is directly related to solving problems in daily life. Social arithmetic is a mathematical topic in which there are fundamental operations of a number related to daily life [37].

In this topic, various things are studied, namely profits, losses, gross, tare, net, discounts, single interest, and taxes. It was also revealed that social arithmetic is part of the mathematical science of financial calculations in everyday life along with other aspects that are only studied in school at the seventh grade junior high school level [38]. So that learning this area of mathematics becomes crucial for junior high school pupils. Because they have immediate applications in daily life and because the questions are tied to story problems with a problem-solving method, this subject is crucial to understand [39]. The growth of self-confidence (self-efficacy) is highly correlated with problem-solving aptitude [40], [41]. In order to solve mathematical issues, particularly those relating to social arithmetic topic, pupils must have a high level of self-efficacy. After interviewing the mathematics teacher at SMP Al-Ulum Medan, according to the mathematics teacher at the school, students have different confidence in solving mathematical problems related to social arithmetic topic.

Numerous studies have been done on self-efficacy, demonstrating its significance in a person. However, no studies have been done that particularly look at students' mathematical self-efficacy in studying social arithmetic topics [42]–[46]. This study intends to test and analyze students' mathematical self-efficacy in learning the topic of social arithmetic based on the description. "What is the description of students' mathematics self-efficacy in learning the topic of social arithmetic" is one of the research questions given.

2. RESEARCH METHOD

This sort of study uses percentages through questionnaire analysis and is a qualitative descriptive study. Descriptive research aims to explain or characterize a situation as it is and interprets things, events, or anything else connected to variables that can be explained both quantitatively and qualitatively. On descriptive research utilizing non-survey, survey, or combined (quantitative and qualitative) data collection methods [47]–[50]. The purpose of this study is to describe students' self-efficacy in understanding the concept of social arithmetic topic.

The level of student self-efficacy in learning social arithmetic topic is assessed using the student's self-efficacy or scale measure in that subject. The scale in this study contains three components, namely students' assessment of: i) the level of task difficulty (magnitude) themselves in social arithmetic topic; ii) the variety of tasks (generality) himself in the topic of social arithmetic; and iii) the degree of stability in completing a task (strength) themselves in the topic of social arithmetic, which has four response options: strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS) [51]. These four options help students avoid making uncertain decisions on the offered claims, and the researcher steers clear of any statements that would cause students to hesitate before responding. The remarks provided about the opinions of the pupils are closed statements and include both positive and negative statements.

The Likert scale model will be applied as the scale model in this research. There are four categories for categorizing the level of agreement with a statement: strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS). This study's attitude scale analysis produced a description of students' self-efficacy in mastering the subject of social arithmetic topic. The purpose of this study is to characterize the students' self-efficacy in learning the social arithmetic topic in first grade at SMP Al-Ulum Medan, Indonesia. In order to describe students' self-efficacy in mastering the concept of social arithmetic topic, this research will do so.

3. RESULTS AND DISCUSSION

The results in this study will describe students' self-efficacy after studying social arithmetic topic. The qualitative data in this study was obtained from the students' self-efficacy scale. The students' self-efficacy attitude scale was given to the social arithmetic class at the end of the lesson. This attitude scale is used to describe self-efficacy in social arithmetic topic. The attitude scale consists of 24 statements (12 positive and 12 negative) containing four characteristics of self-efficacy, namely: students' assessment of the level of difficulty of their task (magnitude) in social arithmetic topic; students' assessment of the variety of tasks (generality) themselves in social arithmetic topic; student's assessment of the degree of stability in completing a task (strength) himself in social arithmetic topic. Each character is developed into several indicators. Analysis of students' self-efficacy attitude scale data using the most analysis or mode. Meanwhile, for the interpretation of students' self-efficacy attitude scale data, it is done using percentage categories based on previous studies [52], [53], which is presented in Table 1.

Table 1. Classification of student self-efficacy attitude scale data

Answer presentation	Interpretation
P =100%	All
75% ≤ P ≤100%	Almost entirely
50% < P <75%	Most of the
P =50%	Half
25% ≤ P <50%	Nearly half
0% < P <25%	Fraction
P =0%	Nobody

For example, suppose statement number 10 is positive, namely "I will not give up when completing a difficult social arithmetic task because I believe if I try, I can do it," resulted in SS=13.2%, S=65.8%, TS=15.7%, STS=5.3%, then the majority (65.8%) agreed, meaning that most students agreed if he would not give up when he completes a difficult social arithmetic task because he believes that if he tries, he can do it. Furthermore, a description of the student's self-efficacy per item will be described based on its characteristics towards learning mathematics.

3.1. Data analysis of student self-efficacy for characteristics of students' assessment of the level of task difficulty (magnitude) themselves in social arithmetic topic

There are several indicators that can be developed in compiling statements that are in accordance with the self-efficacy characteristics of students' assessments of the level of task difficulty (magnitude) themselves in social arithmetic topic. The indicators used in this study are showing that they are able to overcome problems related to the difficulty level of social arithmetic topic tasks; and shows confidence that he is doing the task that he feels capable of carrying out and avoids tasks beyond his limits in social arithmetic topic. The summary of the results of students' self-efficacy calculations for these characteristics is seen in Table 2.

Table 2. Results of calculation of student self-efficacy scores for characteristic 1: Student's assessment of the difficulty of his task (magnitude) in social arithmetic topic

Statement No	Statement Attribute	Statement	SS	S	TS	STS
1	+	I try to understand every topic or social arithmetic task that is considered difficult.	10 26.3%	23 60.5%	4 10.5%	1 2.7%
3	-	I tend to avoid social arithmetic problems that are considered difficult.	0 0%	8 21.1%	22 57.8%	8 21.1%
4	+	I am able to do well on any difficult social arithmetic problems or tasks.	7 18.4%	26 68.4%	5 13.2%	0 0%
5	-	I am confused if the topic or social arithmetic task given is getting more difficult.	0 0%	5 13.2%	25 65.7%	8 21.1%
6	+	I am able to do even easy and difficult social arithmetic tasks without hesitation.	5 13.2%	25 65.8%	6 15.7%	2 5.3%
7	-	I am only able to do and master social arithmetic tasks that are considered easy.	4 10.5%	8 21.1%	18 47.3%	8 21.1%
9	+	I believe that the more difficult the given social arithmetic tasks will spur me to study more diligently.	6 15.8%	27 71%	4 10.5%	1 2.7%
11	-	I am afraid that if the given social arithmetic task gets more difficult I will give up.	2 5.3%	7 18.4%	23 60.5%	6 15.8%

Based on Table 2, it can be seen that for statement number 1 most students agree that they are trying to understand every topic or social arithmetic task that is considered difficult. For statement number 3, most students disagree when they are said to tend to avoid social arithmetic problems that are considered difficult. Then for statement number 4, most of the students agree if they are able to work on any difficult social arithmetic problems or assignments well. For statement number 5, most of the students did not agree when they were said to be confused if the topic or social arithmetic task given was getting more difficult. For statement number 6, most students agree when they are said to be able to do easy and difficult social arithmetic tasks without hesitation.

When it came to assertion number 7, over half of the students disagreed with the claim that they could only complete and master social math assignments that were deemed simple. Most students concur with statement number 9, which states that they think that the harder the assigned social arithmetic topic work will motivate them to study more rigorously. The majority of students did not concur with assertion number 11, which claimed that they were worried they would give up if the assigned social math activity became too challenging. Eight statements about the self-efficacy characteristics of students' assessments of the magnitude of the task difficulty (magnitude) in the social arithmetic topic received positive responses, indicating that students made accurate assessments of the magnitude of the task difficulty (magnitude) in the social arithmetic topic.

3.2. Student self-efficacy data analysis for characteristics of students' assessment of their generality in social arithmetic topic

Students' evaluations of the variety of their tasks (generality) in the social arithmetic topic are some of the indicators that can be developed in constructing statements that are in accordance with the qualities of self-efficacy. The indicators employed in this study are students' confidence in their abilities based on their comprehension of the social arithmetic topic, as well as their ability to recognize that their abilities are restricted to a variety of activities and situations. Table 3 provides a summary of the findings from the calculations of students' self-efficacy for these traits.

As presented in Table 3, it can be seen that for statement number 2 more than half or most of the students agree that they always develop self-confidence when facing problems when learning social arithmetic, because they believe they can overcome these problems. For statement number 8, most of the

students did not agree that they would be afraid if they had problems with social arithmetic while studying. For statement number 10 most of the students agreed that they would not give up when completing a difficult social arithmetic task because they believed that if they tried, they could do it. Then for statement number 12, most of the students did not agree that they easily gave up if there was a difficult social arithmetic task. For statement number 13, most of the students agreed that they did not want to blame others when they had problems with the social arithmetic topic while studying.

For statement number 14, most of the students agreed that they accepted the criticism and suggestions given to them when studying social arithmetic topic. For statement number 15, most of the students did not agree that they often blamed others when they had problems with the social arithmetic topic in learning. As for statement number 20, most of the students disagreed that they did not like it when someone gave criticism and suggestions to them when studying social arithmetic topic. From the eight statements concerning the characteristics of self-efficacy: students' assessments of their generality in the social arithmetic topic, it can be concluded that students rate well about their generality in the social arithmetic topic.

Table 3. Results of calculation of student self-efficacy scores for characteristic 2: Student's assessment of the diversity of his tasks (generality) in social arithmetic topic

Statement No	Statement Attribute	Statement	SS	S	TS	STS
2	+	I always develop self-confidence when facing problems while learning social arithmetic, because I believe I can overcome these problems.	9 23.7%	20 52.6%	6 15.8%	3 7.9%
8	-	I would be afraid if I got into trouble with social arithmetic while studying.	0 0%	9 23.7%	20 52.6%	9 23.7%
10	+	I will not give up when I complete a difficult social arithmetic task because I believe if I try I can do it.	5 13.2%	25 65.8%	6 15.7%	2 5.3%
12	-	I give up easily when there is a difficult social arithmetic task.	1 2.6%	8 21.1%	23 60.5%	6 15.8%
13	+	I don't want to blame others when I have problems with social arithmetic topic while studying.	3 7.9%	20 52.6%	10 26.3%	5 13.2%
14	+	I accept criticism and suggestions given to me when studying social arithmetic topic.	6 15.7%	23 60.5%	8 21.1%	1 2.7%
15	-	I often blame others when I have problems with social arithmetic in studying.	3 7.9%	9 23.7%	22 57.8%	4 10.5%
20	-	I don't like it when there are people who give me criticism and suggestions when learning social arithmetic topic.	1 2.7%	6 15.7%	24 63.2%	7 18.4%

3.3. Student self-efficacy data analysis for characteristics of students' assessment of the degree of strength in completing a task (strength) in social arithmetic topic

The degree of stability in completing a task (one's strength) in the social math topic is one of the indicators that students evaluate when compiling statements that are in accordance with the characteristics of self-efficacy. Students' confidence in their ability to succeed in each task of the social arithmetic topic and high expectations for their own abilities that motivate them to work toward success are the indicators used in this study. Table 4 provides a summary of the findings from the students' self-efficacy estimations for these traits.

From Table 4 it can be seen that for statement number 16 most students agree that they believe if they try to be diligent in studying social arithmetic topic then they can achieve the goals they want. For statement number 17, most of the students did not agree that they played more often when studying social arithmetic topic. Then for statement number 18, most of the students did not agree if they did not concentrate when studying on social arithmetic topic and spent more time playing cellphones (HP). For statement number 19, most students agree that they believe that if I use my time studying on social arithmetic topic well, I will get good results as well. And for statement number 21 almost all students agree that they always act on the basis that they have the ability in social arithmetic topic to achieve success.

Then for statement number 22, almost all of the students did not agree that they acted without thinking what to do when learning social arithmetic topic. For statement number 23, most of the students agree that they enjoy studying math books other than textbooks. Nearly every student who responded to statement number 21 stated that they always studied well in advance of the arithmetic test. As for statement number 22, most of the students did not agree that they always had a lot of difficulties when taking math tests. For statement number 23, most of the students agree that they always struggle with learning problems on social arithmetic topic so that they can succeed. For statement number 24, most of the students did not

agree that they quickly gave up when they had problems with social arithmetic topic while studying. Of the eight statements concerning the characteristics of self-efficacy: students' assessments of the degree of stability in completing a task (strength) themselves in social arithmetic topic, the eight statements with positive responses can be said that students assess the degree of stability in completing a task (strength) themselves. in social arithmetic topic.

Table 4. Results of calculation of students' self-efficacy scores for characteristic 4: Student assessment of the degree of strength in completing a task (strength) in social arithmetic topic

No	Statement attribute	Statement	SS	S	TS	STS
16	+	I believe if I try to be diligent in studying social arithmetic topic then I can achieve the goals I want.	8 21.1%	23 60.5%	5 13.2%	2 5.2%
17	-	I often play around while studying social arithmetic topic.	1 2.7%	7 18.4%	22 57.8%	8 21.1%
18	-	I do not concentrate when studying social arithmetic and spend more time playing with my handphone (HP).	4 10.5%	8 21.1%	25 65.7%	1 2.7%
19	+	I am sure that if I use my time studying on social arithmetic topic well, I will get good results too.	4 10.5%	27 71%	7 18.5%	0 0%
21	+	I always act on the basis that I have the ability in social arithmetic topic to achieve success.	6 15.7%	30 78.9%	1 2.7%	1 2.7%
22	-	I act without thinking what to do when studying social arithmetic topic.	0 0%	5 13.2%	30 78.9%	3 7.9%
23	+	I always struggle with learning problems on social arithmetic topic so that I can succeed.	9 23.7%	25 65.8%	3 7.8%	1 2.7%
24	-	I give up quickly when I have problems with social arithmetic topic while studying.	1 2.7%	10 26.3%	23 60.5%	4 10.5%

Furthermore, a description of the overall student self-efficacy in social arithmetic topic will be described. Analysis of the data by making a frequency distribution on the alternative answers chosen by students. The decision is SS=4, S=3, TS=2, STS=1 for positive statements, but STS=4, TS=3, S=2, SS=1 for negative ones. Table 5 provides the outcomes of the recapitulation of all students' overall self-efficacy scores on the social arithmetic topic.

The chart shows that students generally have high levels of self-efficacy when learning social arithmetic topic. Alternative answers for points from low to high indicate that the response is increasingly positive. It can be seen in the table that the overall response to the statements in the self-efficacy attitude scale is the most in alternative answer 3 of 62.60%. Meanwhile, if it is divided into two positive and negative categories, the negative response shows as many as 20.95% of students, and the positive response shows that there are 79.05% of students, meaning that almost all students evaluate themselves positively when studying social arithmetic topic.

This is consistent with the idea of self-efficacy, which is the belief that a person can face and solve the problems that he encounters in a variety of situations and be able to decide actions in completing certain tasks or problems, so that the person is able to overcome challenges and accomplish the desired goals. Because of this, people with high self-efficacy prefer to choose to participate actively in tasks. High self-efficacy people frequently complete projects, regardless of how challenging they may be. The task is not perceived by them as a danger they must avoid [54]. Additionally, they form goals and are dedicated to achieving those goals. They also develop an intrinsic and deep interest in an activity. They intensify their efforts to avert such failures as well. After failing at something, people typically quickly regain their confidence in themselves [55]. Thus, it can be concluded that students generally have a high level of self-efficacy when learning a topic in learning social arithmetic.

In learning mathematics, there are characteristics of social arithmetic topic in economic activities, in the form of overall prices, unit prices, and partial prices. In addition, there are also purchase prices, selling prices, profit and loss as well as discount rebates, gross, tare, and net. Calculating total value, value per unit, partial value, purchase price, selling price, profit, loss, discount (rebate), gross, tara, and net are all examples of social math topics that are relevant to our daily lives. Thus, it can be inferred that this social mathematics subject always has a practical application. The characteristics of the social arithmetic topic can encourage students to learn more about it and work through its issues. Therefore, students' self-efficacy is positively impacted by the social math problem-solving theme.

This is in keeping with studies which indicated that there was an increase in students' learning motivation and problem solving in line with the high self-efficacy of students which stated that self-efficacy had an effect on student problem solving. This indicates that a student's capacity for problem-solving

increases with self-efficacy [39]. Thus, a positive tendency towards students' self-efficacy in arithmetic topic can increase students' motivation to learn better in learning social arithmetic topic.

Students who study social arithmetic typically exhibit a favorable tendency toward self-efficacy. In the social arithmetic topic, for instance, students demonstrate their ability to overcome challenges related to the level of difficulty of the tasks. They also demonstrate confidence in their ability to complete tasks within their comfort zones. Thus, it can be concluded that students with high levels of self-efficacy will benefit from improved learning outcomes and mathematical skills in the area of social arithmetic topic.

Table 5. Data recapitulation of students' self-efficacy attitude scale on social arithmetic topic overall

	No item	Alternative answer			
		1	2	3	4
Students' assessment of the level of task difficulty (magnitude) themselves in social arithmetic topic.	1	1	4	23	10
	3	0	8	22	8
	4	0	5	26	7
	5	0	5	25	8
	6	2	6	25	5
	7	4	8	18	8
	9	1	4	27	6
	11	2	7	23	6
Students' assessment of the diversity of their tasks (generality) in social arithmetic topic.	2	3	6	20	9
	8	0	9	20	9
	10	2	6	25	5
	12	1	8	23	6
	13	5	10	20	3
	14	1	8	23	6
	15	3	9	22	4
	20	1	6	24	7
Students' assessment of the degree of stability in completing a task (strength) themselves in social arithmetic topic.	16	2	5	23	8
	17	1	7	22	8
	18	4	8	25	1
	19	0	7	27	4
	21	1	1	30	6
	22	0	5	30	3
	23	1	3	25	9
	24	1	10	23	4
	Total	36	155	571	150
	Percentage (SMI=912)	3.95%	17%	62.60%	16.45%
		20.95%		79.05%	

4. CONCLUSION

Based on the analysis of research results related to self-efficacy in mathematics, it can be concluded that it can be seen that the overall learning of social arithmetic topic shows that there are 79.05% of students giving positive responses. This means that almost all students evaluate themselves positively when learning mathematics at school of social arithmetic topic. Therefore, students with high levels of self-efficacy will perform better academically and have stronger mathematical skills in the area of social arithmetic topic.

However, schools and teachers are expected to create creative and innovative learning that includes social arithmetic topic to generate interest, motivate students to learn, and improve student self-efficacy in all subjects. In addition, we encourage you to use different subject matter to help your students identify and develop their self-efficacy. The researcher suggests that future researchers use social arithmetic topic to conduct similar research that is deeper, broader, and complements other mathematical skills.

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