Mathematical Ability in Terms of Socioeconomic Status and Mathematical Self-Efficacy

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Abstract

This study aims to examine students' mathematical abilities in algebra and numbers and then these abilities are viewed from socioeconomic status and mathematical self-efficacy. This study uses a descriptive design that will be examined by PGMI students at a state university in North Sumatra. The data was obtained by looking at the scores from the students' mathematical ability tests, the scores from the questionnaires and the mathematical self-efficacy scale. Data were analyzed using descriptive analysis techniques using the normal curve approach. The results showed that 1) the mathematical abilities of students who had low, medium, and high socioeconomic status were classified as the same for each category with low results, 2) the mathematical self-efficacy of students who had high and moderate had low mathematical abilities.

Keywords: *Mathematical Ability; Socioeconomic Status; Mathematical Self-Efficacy.*

Abstrak

Penelitian ini bertujuan untuk mengkaji kemampuan matematika mahasiswa pada materi aljabar dan bilangan selanjutnya kemampuan tersebut ditinjau dari status sosial ekonomi dan *self-efficacy* matematis. Penelitian ini menggunakan desain deskriptif yang akan diteliti mahasiswa PGMI pada satu perguruan tinggi negeri di Sumatera Utara. Data diperoleh dengan melihat nilai dari tes kemampuan matematika mahasiswa, skor dari kuesioner dan skala *self-efficacy* matematis. Data dianalisis dengan teknik analisis deskriptif menggunakan pendekatan kurva normal. Hasil penelitian menunjukkan bahwa 1) kemampuan metematika mahasiswa yang memiliki status sosial ekonomi rendah, sedang, dan tinggi tergolong sama untuk masing-masing kategori dengan hasil rendah, 2) *self-efficacy* matematis mahasiswa yang tinggi dan sedang memiliki kemampuan matematika yang rendah.

Kata Kunci: Kemampuan Matematika; Status Sosial Ekonomi; *Self-Efficacy* Matematis.

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INTRODUCTION

Education is one of the efforts that a person makes to change himself in everything, one of which is cognitive. Cognitive is all mental activity that makes an individual able to relate, assess, and consider an event, so that the individual gains knowledge afterwards. Cognitive is very close to the level of one's intelligence. As a cognitive example can be shown when someone is learning, building an idea, and or solving a problem. A person's ability to build an idea, and or solve a problem is referred to as cognitive ability.

Cognitive ability is one of the goals of educational activities. Education at the primary school level and subsequent levels requires students to study all areas of study including mathematics.

Mathematics at the Elementary School (SD)/Madrasah Ibtidaiyah (MI) level is taught by the class teacher. Therefore, mathematics is one of the fields of study that must be mastered by elementary / MI teachers. Before becoming an elementary / MI teacher, you must study at a university called a student, through this education, prospective elementary / MI teacher students are equipped with mathematics, so that later they will be able to teach mathematics to elementary / MI students.

Mathematical ability is the ability or ability to use principles, properties, and formulas to solve mathematical problems. Mathematics presented to prospective elementary school / MI teacher students includes algebra, numbers, arithmetic, geometry, and measurement and data processing. The study is taught to prospective elementary school / MI teacher students, who are spread over several semesters.

The mathematical ability gained after learning in class and at home is influenced by many factors. Mathematics skills after being a student are certainly due to the mathematical abilities that have been obtained in elementary, junior high school, and senior high school. Not a few students during the school period, mathematics skills are obtained with the support of additional non-formal learning such as tutoring or private tutoring. In getting learning facilities including tutoring

or private support, of course, parents spend a lot of money, so that their children get math skills.

One thing that has been heard from one public school in North Sumatra is that parents do not allow their children to participate in additional learning from school, because parents whose daily lives are in need of the help of their children who are still in junior high school to keep their younger siblings at home, and there is even the child's energy needed by parents to help them farm. In other words, there are very few opportunities and time to learn from a child who is in an environment with such parents.

As for the impact that is seen due to these conditions, students who do not understand the material that has been given by the teacher will make students not achieve competence and do not achieve learning completion which will lead to difficulties in learning the next material. Mathematics lessons that are not understood by students that are continuous and pile up then mathematics will forever be mystery for him or mathematics will never be understood by students forever.

Based on this, one of them that determines mathematical ability is the socioeconomic status of the family or parents. Parents play a big role in determining a child's success in learning. Parents play a role in providing children's needs, including providing facilities in learning for their children. The ability to provide this facility is greatly influenced by the socioeconomic status of the parents.

Social status is the position of a person in a social group or the position of one group with another. Socioeconomic status is a grouping of people viewed due to occupation, education, and economics that share common characteristics (Santrock, 2014). In line with other opinions, socioeconomic status includes parents' education level, type of work, and parents' income, parental positions, special facilities and valuables at home such as televisions, washing machines, refrigerators, and so on (Mahmud, 1990). Likewise, Abdulsyani's opinion follows that socioeconomic status is a position or of someone in a human group

determined by the type of economic activity, income, level of education, type of residence, position in the organization (Febriana, Sefti & Wafrotur, 2014).

Based on this, it can be stated that socioeconomic status is high if you get a high income, high education, adequate employment, and used equipment/transport and a high house. On the other hand, for low socioeconomic status, namely small salaries, low education, inadequate work, equipment/transportation and a simple house.

There have been many studies that have examined the relationship between mathematical ability and socioeconomic status. Research conducted at the elementary level shows that there is an influence of socioeconomic status on student learning outcomes (Indrawati, 2009); Hidayana, 2018; Sari, 2018). The results of the study in elementary schools are inversely proportional to the junior high school level, the results of the study show that the socioeconomic status of students' parents has no influence on mathematics learning outcomes on the subject matter of building a flat side room (Sundari, 2014). The results of other studies used the sample, namely students majoring in mathematics, whose results showed that students from socioeconomic status were less likely to perform better than other social status students (Dewanto, 2008).

In addition to cognitive, namely mathematical ability, there is one thing that needs to be researched for prospective class teachers who also teach mathematics at the elementary level, namely mathematical self-efficacy. Bandura states that self-efficacy is a person's belief in his ability to organize and carry out the set of actions needed to achieve goals (in Woolfolk, 2009). Mathematical self-efficacy is a person's self-confidence in his ability to learn and solve mathematical problems and succeed in mathematics. People who have strong self-efficacy such as "I'm good at mathematics" then that person will have a tendency to consider failure due to lack of effort (Woolfolk, 2009).

The results showed that there was a relationship between self-efficacy and student mathematics learning outcomes (Alminingtias & dkk, 2018). In line with other studies whose research on low-grade students, namely elementary school students in grades I, II, and III, the results showed that there was a significant

relationship between mathematical self-efficacy and student mathematics learning outcomes. Another study showed that there was no influence of self-efficacy on the basic mathematics learning outcomes of PGMI students in the odd semester of STAI Darul Ulum Kandangan for the 2020/2021 academic year (Asyriah & dkk, 2021, dkk, 2021).). Further research, namely the results, showed that self-efficacy each affected the mathematics learning achievement of PGSD students and PGMI students and the average mathematical self-efficacy of PGSD students was higher than that of PGMI students (Hamdi & Abadi, 2014).

One study that connects the three (mathematical achievement, self-efficacy, and socioeconomic status) is research from Li & Dkk, (2020) with socioeconomic status as a moderate variable, by conducting large-scale assessments and surveys in China, namely data from the National Assessment Center for Education Quality (NACEQ) Project, which is a sample of 8,707 grade IV elementary school students and 129 Mathematics teachers, with the tiered analysis method students represent level-1 units and teachers represent level-2 units, the results show that there is an indirect relationship between cognitive activation, mathematical achievement through mathematical self-efficacy moderated by socioeconomic status both at the student level and the teacher level, from these results also the researcher stated the importance of cognitive activation instruction especially lower socioeconomic status students and lower socioeconomic status average grades.

The next study that linked the three variables, namely from (Kalaycioglu, 2015), with a study testing the relationship between variables of socioeconomic status, mathematical self-efficacy, anxiety, and mathematical achievement using structural equation models, using a sample of 8,806 students from the UK, Greece, Hong Kong, the Netherlands, Turkey, and the United States who participated in PISA 2012 showed that socioeconomic status affects students' mathematics learning achievement, highest in the Netherlands and lowest in Hong Kong, further research results state that self-efficacy is the highest predictor in students' mathematical achievement among anxiety and socioeconomic status. The next study that linked the three variables, namely (Yildirim, 2019) to the

study of the direct or indirect influence of SSE through parental involvement and confidence in students' mathematics learning, with a multilevel analysis in the Trends in International Mathematics and Science Study (TIMSS) in 2011 in Turkey, using the responses of eighth graders as many as 6928 students (49% women) and the responses of principals as many as 239 people, and the results showed that SSE and parental involvement whose predictors were self-efficacy as the strongest in mathematical achievement, from these results also the researcher stated the importance of testing the role of parental involvement in the mediation of relationships between socioeconomic status and student mathematics learning achievement.

Previous research only explained for the elementary, junior high school and mathematics department students and mathematics teachers, no one has explained the relationship between mathematics ability and socioeconomic status for prospective elementary class teacher students. The difference between previous research and this research is related to mathematical ability with mathematical self-efficacy, namely this research only looks at mathematical ability for algebra and numbers. Because not a few state that among other mathematical studies the most difficult to learn is algebra. Therefore, this study aims to describe 1) students' mathematics ability in terms of the socioeconomic status of prospective elementary / MI class teachers, 2) mathematics ability in terms of mathematical self-efficacy of prospective elementary / MI class teachers.

RESEARCH METHODS

The research was conducted with a descriptive type of research, because this study aims to obtain a detailed picture of the mathematical abilities (algebra and numbers) of students who have high, medium, and low socioeconomic status and are also associated with the mathematical self-efficacy of these students. In addition, the purpose of this implementation is that the results of this research will be used as a basis for conducting further research by applying learning models to improve students' mathematical abilities and mathematical self-efficacy.

The research was carried out in North Sumatra, namely at one of the state universities. The subject of this study was a student of Madrasah Ibtidaiyah Teacher Education (PGMI) who studied algebra and number material. The results of this study will be used as a basis in choosing a learning model that can improve students' mathematical abilities (algebra and numbers).

Students' mathematical ability data were obtained by providing mathematical tests related to algebra and numbers as many as 14 questions, while socioeconomic status and mathematical self-efficacy were each obtained by distributing questionnaires and scales, each of which was 20 questions. The questionnaire related to socioeconomic status was prepared by looking at aspects of parental education, the position of parents in the community, parents' income per month, the type of facilities owned (car, motorcycle, bicycle, VCD player, television, radio, armoire, mobile phones, washing machine, computer), house (house status, house walls, house floor, type of lighting, water source, number of bathrooms) and land (gardens and rice fields). The self-efficacy scale is compiled using positive statements and negative statements that are compiled based on self-efficacy indicators, namely judging self-abilities, organizing tasks, predicting success in business, and achieving achievements.

In the socioeconomic status questionnaire for each question item, four options are provided while the self-efficacy scale is provided with options such as highly appropriate, appropriate, non-conforming and highly non-conforming. The value of mathematical ability uses a scale of 0 – 100. Data on students' mathematical ability, socioeconomic status and mathematical self-efficacy are classified into 3 categories of diagnosis, namely high, medium, and low. The categories of socioeconomic status of student parents and mathematical self-efficacy are grouped with the following conditions:

$$X < (\mu - 1{,}0\sigma) \qquad \text{Low}$$
$$(\mu - 1{,}0\sigma) \leq X < (\mu + 1{,}0\sigma) \qquad \text{Medium}$$
$$(\mu + 1{,}0\sigma) \leq X \qquad \text{High}$$

RESULTS AND DISCUSSION

Students' mathematical ability to algebraic material and numbers based on the results of the student answer test obtained an average of 69.51 with a standard deviation of 13.59. Furthermore, the students' mathematical abilities are grouped, the results of which show that there are only two variations, namely including the medium and low categories. When grouped scores from mathematical proficiency tests (algebra and numbers) were obtained, there were 35 people in the low category and there were 5 people in the medium category, while the high category did not exist. It can be stated that the average student's mathematical ability belongs to the moderate category.

The questionnaire that has been collected shows that PGMI students for socioeconomic status (SSE) have three statuses, namely high, medium and low. The socioeconomic status that falls into the high category is one person, the medium category is 33 people and 6 people belong to the low category. Mathematical self-efficacy of students, there are only medium and high categories that are 2 people have high mathematical self-efficacy and 38 people have medium category mathematical self-efficacy.

Mathematical ability in terms of each aspect, namely socioeconomic status and mathematical self-efficacy is described by determining the average and standard deviation in each category. As for the mathematical ability in question, it can be seen in Table 1 and Table 2 below:

Table 1. Mathematical Ability Based on Parents' Socioeconomic Status

Mathematical Ability / Socioeconomic Status	Average	Standard Deviation
High	30	-
Medium	35,61	13,97
Low	36,67	11,05

The difference in students' mathematical abilities between high, medium, and low socioeconomic status can also be seen in the following diagram.
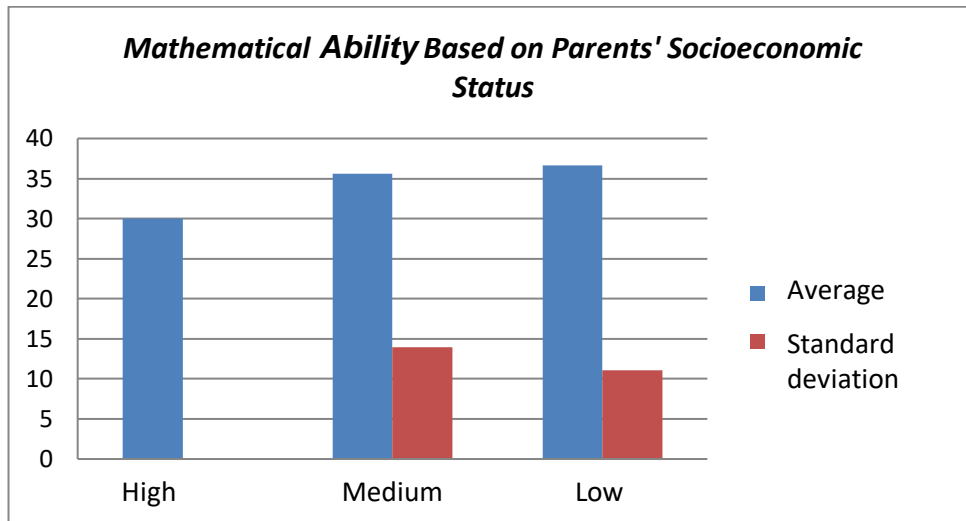
Figure 1. Bar Chart of Students' Mathematical Abilities Derived from High Socioeconomic Status, Medium Socioeconomic Status, and Low Socioeconomic Status.

Furthermore, what will be described is data related to the self-effication of PGMI students and its relation to the level of mathematical ability with algebraic and number materials. The static description used is to calculate the average and standard deviation, it can be seen in Table 2

The difference in students' mathematical abilities between high, medium, and low self-efficacy can also be seen in the following diagram,
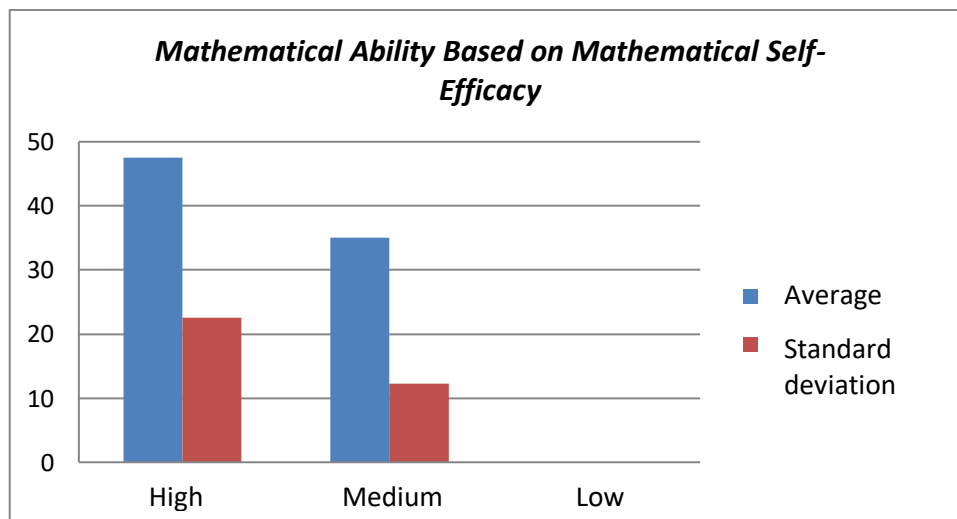

Figure 2. The Bar Chart of Students' Mathematical Abilities is Reviewed from Low, Medium, and High Self-Efficacy.

Table 2. Mathematical Ability Based on Mathematical Self-Efficacy

Self-Efficacy Matematis / Mathematical Ability	Average	Standard Deviation
High	47,5	22,5
Medium	35	12,29
Low	-	-

Students' mathematical abilities when viewed from the socioeconomic status of parents there are low, medium, and high levels. The mathematics ability of each student is classified as low and moderate with dominated students who come from families with medium socioeconomic status. There is only one student with high social status with low mathematics ability.

Mathematical self-efficacy in terms of the socioeconomic status of parents is only obtained at two levels, namely high and medium. Mathematical self-efficacy of students who come from families with high social status shows mathematical self-efficacy which is classified as moderate and there are 2 students who have mathematical self-efficacy including high categories, both students come from families with medium socioeconomic status.

Based on the data seen in Table 1 and Table 2, it can be seen that mathematical ability for each category (low, medium, and high) both socioeconomic status and mathematical self-efficacy, is obtained by averaging low categories which means that the student's mathematical ability is low. Thus, the differences that exist, namely high, medium, and low socioeconomic status of students do not make the student's mathematical ability different, it can be seen that their mathematical ability can be expressed as the same, namely low.

Diagram 1 and Diagram 2 explain that students' mathematical abilities when viewed from high self-efficacy are in the medium category while students' mathematical abilities when viewed from high socioeconomic status are in the low category. Students' mathematical ability when viewed from the socioeconomic status of the middle level and also seen as mathematical ability in terms of medium self-efficacy, the two are obtained with almost the same

average, namely 35 only a difference of 0.61 and 0.61 is more in socioeconomic status. It can be stated that for the high category the mathematical ability is different but not so with the medium level, the medium level of ability is both at a medium level .

Students who come from families with high socioeconomic status do not guarantee that a person will be highly capable in mathematics. In other words, socioeconomic status does not guarantee its ability in mathematics. In line with previous research, namely that Socialeconomic Status parents of students have no influence on mathematics learning outcomes (Sundari, 2014), another research result that students majoring in mathematics who come from socioeconomic status are less likely to perform better than other social status students (Dewanto, 2008).

Mathematical self-efficacy of students is dominated by the medium category, which in mathematical abilities varies, namely medium, and low. Thus, students with moderate abilities include students who have high and medium metematic self-efficacy. In line with the results of previous studies, there is a relationship between self-efficacy and student mathematics learning outcomes (Alminingtias et al, 2018; Asyriah, et al, 2021; Hamdi and Agus 2014).

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Students who have high mathematical self-efficacy will encourage themselves to continue to be enthusiastic and unyielding so that they can find answers or solutions to mathematical problems or math problems that are right in front of them. Students who have mathematical self-efficacy will also continue to strive so that the mathematical material can be understood and mastered. In other

words, the level of mathematical self-efficacy of students shows that there are differences in students' mathematical abilities and socioeconomic status does not show differences in students' mathematical abilities.

The socioeconomic status attached to a person is material which means that the socioeconomic status will not always exist and be the same at different times and places. Self-efficacy and mathematical ability at any given moment may change in the near and long term, which is influenced by experience and external factors. The results of the results obtained from the distribution of questionnaires and tests showed that PGMI students had five variations if the three things (socioeconomic status, self-efficacy, and mathematical ability were connected. Seeing that the first factor is socioeconomic status and the second factor is self-efficacy and consequently mathematical ability, the variations obtained mean that among students who are socioeconomic status (high) and Self-efficacy (medium) and mathematics ability (low) there is one student, students who are socioeconomic status (medium) and self-efficacy (medium) and mathematics ability (medium) are as many as three students, students who are socioeconomic status (SSE) (medium) and self-efficacy (high) and mathematics ability (medium) there is one student, students who are socioeconomic status (medium) and self-efficacy (high) and mathematics ability (low) there is one student, students who are socioeconomic status (medium) and self-efficacy (medium) and mathematics ability (low) there are as many as 28 students, and students who are socioeconomic status (low) and self-efficacy (medium) and mathematics ability (medium) there is one student while students who are socioeconomic status (low) and self-efficacy (medium) and mathematics ability (medium) as many as five students, and socioeconomic status (low) and self-efficacy (medium) and mathematics ability (low) there is one student.

Students who have high-level Socioeconomic status (SSE) have moderate self-efficacy and low mathematical ability. Students who have SSE at the medium level seem to have two variations, namely medium and high while their mathematical skills are medium and low. Students who have socioeconomic status (SSE) at a low level seem to have two variations of self-efficaci, namely medium

and low and their mathematical abilities are also medium and low. The results of previous studies stated that socioeconomic status and self-efficacy have an influence on students' mathematical achievement (Kalaycioglu, 2015; Li et al, 2020; Yildirim 2019).

Mathematical achievement is strongly influenced by intrinsic factors and extrinsic factors. Intrinsic factors are factors found in a person including self-efficacy while extrinsic factors are factors that are outside of a person including the socioeconomic status of parents or family. A person uses several factors to achieve learning achievements or these factors support each other in achieving learning achievements. Which factors are more dominant in influencing learning achievement needs to be studied further so that these dominant factors can be optimized in achieving learning achievements. It should also be understood that self-efficacy needs to be encouraged or improved in learners and does not show differences in socioeconomic status between learners.

CONCLUSION

Mathematics ability in terms of the socioeconomic status of parents, namely high socioeconomic status, it can be seen that mathematics ability is low, socioeconomic status is moderate, it can be seen that mathematics ability is low, and socioeconomic status is low, it can be seen that mathematical ability is also low. Likewise, the mathematical self-efficacy of students who are high and moderate in their mathematical abilities are seen to be low.

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