

SELF-REGULATED LEARNING AS MEDIATOR ON THE DETERMINANTS OF MATHEMATICS ACHIEVEMENT IN JUNIOR HIGH SCHOOL STUDENTS IN THE CITY OF DKI JAKARTA PUSAT

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Abstract. The purpose of this study was to determine the effect of parental support, attitudes towards mathematics, and mastery goal orientation on mathematics learning achievement with self-regulated learning as a mediator. The research method that the researcher uses is a structural model with a total of 327 respondents who were taken using cluster random sampling technique. The data analysis technique used in this research is SEM AMOS. Based on the results of the model test, it is known that the influence of parental support, attitudes towards mathematics, and the orientation of mastery goals on mathematics learning achievement with self-regulated learning as a mediator, according to empirical data. Based on the results of statistical tests, it is known that parental support, attitudes towards mathematics lessons, and orientation of mastery goals have no effect on learning achievement in mathematics with self-regulated learning as a mediator.

Keywords: parental support; mastery goal orientation; self-regulated learning; math achievement.

INTRODUCTION

One of the subjects that are considered important in formal education in Indonesia and are given from elementary school to high school is mathematics. The achievement of the objectives of learning mathematics at the junior high school level is very important in the learning process. This is as stated in the attachment of the Minister of Education and Culture Number 58 of 2014 concerning the SMP curriculum, it is explained that the objectives of students to study mathematics are: a. Understanding mathematical concepts is competence in explaining the relationship between concepts and using concepts and algorithms flexibly, accurately, efficiently, and precisely in problem-solving. b. Communicating ideas, reasoning, and being able to compile mathematical proofs by using complete sentences, symbols, tables, diagrams, or other media to clarify situations or problems. c. Have an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention, and interest in learning mathematics, as well as a tenacious and confident attitude in problem-solving. d. Using simple Praga tools and technology results to carry out mathematical activities. These skills or abilities are closely related, one strengthening and needing the other.

Mathematical ability can be seen in a person's ability to calculate, measure, and solve mathematical things. Various

components of mathematical ability are logical thinking, problem-solving, sharpness in seeing patterns, quantitative concept recognition, and time and causal relationships. In some countries, performance in mathematics continues to be a problem, for example, Philippines ([Alpacion, Camañan, Gregorio, Panlaan, & Tudy, 2014](#)), Portugal ([Mata, Monteiro, & Peixoto, 2012](#)), Tanzania ([Mazana, Suero Montero, & Olifage, 2019](#)), Malaysia ([Ayob & Yasin, 2017](#)), Kenya ([Langat, 2015](#)). In Indonesia, student performance in mathematics has also not shown optimal results ([Argina, Mitra, Ijabah, & Setiawan, 2017](#))

The initial data collection was carried out on the achievement of students who took the national exam in Indonesia by the Education Assessment Center, there were four subjects tested Indonesian, English, Mathematics, and Science. Specifically for mathematics, it can be seen that in the last five years (2015 – 2019) public and private education units showed average scores that were below other subjects (Indonesian, English, and science). The average score for each subject is 50. In Table 1. it can be seen that in 2015, the average score obtained by students for mathematics was 56.4; in 2016 the average score was 49.84; in 2017 the average score was 50.34; 2018 average score is 44.05, and in 2019 the average score was 46.56. Based on this data, it can be seen that the mastery of mathematics material is still not optimal.

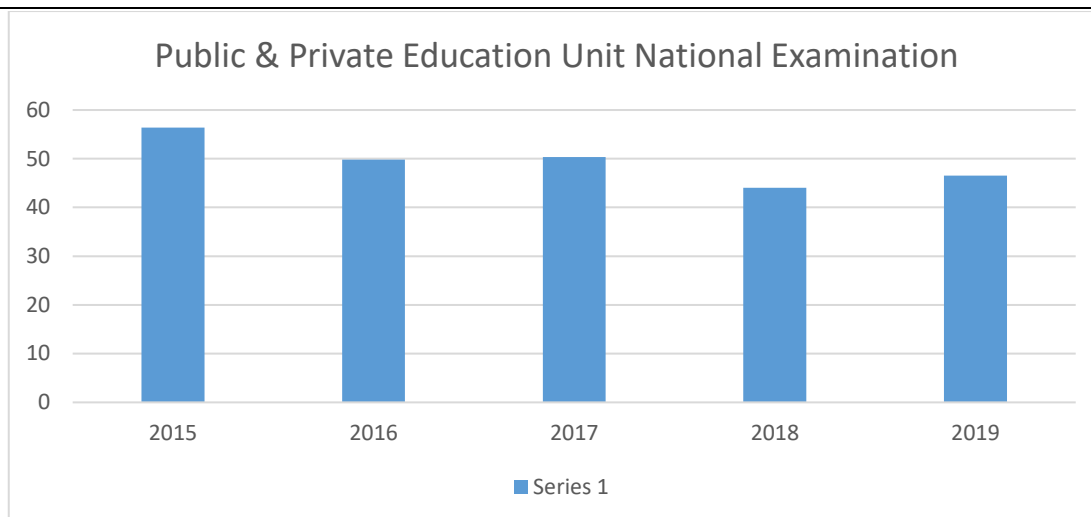


Figure 1. Results of the National Examination for Public & Private Education Units

One of the benchmarks for high and low student learning outcomes in a country is student achievement in the International Student Assessment Program (PISA) in mathematics organized by the Organization for Economic Co-operation Development (OECD). PISA aims to measure how well students can apply the knowledge and skills they are likely to have learned in school in the types of situations they are likely to encounter after school. PISA measures the knowledge and abilities of 15-year-olds. The main concepts for the PISA assessment are reading, science, and math: how well students can apply the knowledge and skills they have learned in school to real-life challenges (Stacey, 2010). The achievements of Indonesian students who took part in this competition in 2015 only ranked 63 out of 70 participants with an average score of 386, which is below the international average score of 490 (OECD, 2018).

Meanwhile, the results of the Trends International Mathematics and Science Study (TIMSS) survey in 2011, Indonesia was ranked 38 out of 42 countries, and

provinces in Indonesia were far behind compared to other ASEAN countries such as Singapore, Thailand, and Malaysia (Kusumaningrum & Alsa, 2016). The TIMSS test is based on a careful analysis of the expected curriculum in the participating countries at the specified grade level. This test is designed to assess performance as fairly as possible on items that reflect the core of the curriculum (Stacey, 2010). Currently, in Indonesia learning mathematics using the 2013 curriculum follows the standard curriculum used by TIMSS.

Although on average, the results of the PISA and TIMSS studies show that students' mathematical abilities in Indonesia are still low, some of them have high abilities. This can be seen from the achievements of Indonesian students who won many medals including gold medals at the India International Mathematical Competition (InIMC) in June 2017 (Fenanlampir, Batlolona, & Imelda, 2019). This shows that the ability of participants in mastering mathematics is different.

Attitudes towards mathematics are

directly positively and significantly correlated with student performance ([Alpacion et al.](#), 2014). This is supported by the results of research conducted by ([Ngussa & Mbuti](#), 2017) on high school students in Arusha, Tanzania, who found that students' positive attitudes can improve students' performance in mathematics. ([Alpacion et al.](#), 2014) suggests that performance in Mathematics can be improved by developing a positive attitude towards the subject.

When students are involved in mathematical activity, they will continuously evaluate their learning situation to keep them in line with their personal goals (Hannula, 2002). The process to activate and regulate thoughts, behavior, and emotions in achieving a goal is called self-regulation. When these goals are related to learning, then the self-regulation in question is self-regulation in learning (self-regulated learning) ([Mokhtar, Tarmizi, Ayub, & Nawawi](#), 2013). The results of research conducted by ([Siregar, Solfitri, & Siregar](#), 2021) found that students' attitudes towards mathematics towards self-regulation in learning have a significant correlation with a contribution of 58%.

Self-regulatory learning is seen as a combination of skill and will. Skills refer to the use of cognitive and metacognitive strategies that include goal setting, planning and organizing learning, self-monitoring, self-evaluation, time management, and resources. Meanwhile, desire refers to an individual's motivational orientation in terms of goals, values, and expectations.

Previous research supports the

importance of self-regulation on academic achievement. As has been pointed out by Pintrich, Roeser, and De Groot, 1994; Chen, 2002. Students with high achievement use more self-regulated learning strategies than students with low achievement. In addition, ([Febrianela](#), 2013), of which concluded that students who have high self-regulation learning are followed by high academic achievement.

Students' mathematical problem-solving abilities are also influenced by mastery goal orientation. The results of experimental research conducted by ([Suwono, Pratiwi, Susanto, & Susilo](#), 2017) provide treatment in the form of learning using the mastery goal orientation learning model. In this study, there are two groups of classes, namely experimental and control. In the experimental class, treatment is given in the form of learning by using the mastery goal orientation learning model where mastery of learning is the main point, and learning in the control class is carried out conventionally using lecture, question, and answer methods, and giving assignments. Based on the research data, it was found that the average mathematical problem-solving ability of students in learning using the mastery goal orientation learning model has increased compared to the control group.

Therefore, variations in the level of learning based on students' self-regulation indicate a difference in the conditions of motivation and strategies used by students in completing their academic assignments. In addition, the availability of a supportive environment and precisely the actions taken will bring a strong impetus to

individuals in achieving their learning goals. According to Schunk (2012), the creation of a supportive environment will help students maximize their learning activities.

Learning based on self-regulation can also be taught and supported by parents through modeling, encouraging, facilitating, rewarding goal setting, using good strategies, and other processes. (Martine-Pons, 2002 in Latipah, 2010). Students who get social support will be able to reduce the pressure and anxiety felt by students when students are cognitively difficult to learn something or avoid academic assignments. The role of the environment is a source of support to meet students' needs for anxiety and fear that involve students emotionally ([Kusumaningrum & Alsa, 2016](#)).

The results of research conducted by ([Solichin, Muchlis, & Ferdiant, 2021](#)) found that there was a significant influence between learning based on self-regulation and parental support on student learning outcomes in economics subjects in the Social Sciences study program at SMA Negeri in Jombang. In addition, Martinez-Pons, 2009 (Latipah, 2010) suggests that parental involvement can improve learning based on their children's self-regulation so that academic achievement increases. The existence of a combination of learning based on self-regulation and social support is expected to improve students' mathematics learning outcomes.

METHODS

The approach that the researcher uses in this research is a quantitative approach, which is a research approach that uses numerical data to explain phenomena and answer research results. The research model used in this study is a structural model, namely a research model that wants to know the direct and indirect effects of one variable on other variables.

The subjects in this study were seventh-grade students of State Junior High Schools in Kemayoran District, Central Jakarta City, DKI Jakarta Province. The sampling technique used was Cluster Random Sampling, with a total of 327 people. The research instrument used to measure the five variables in this study used a parental support scale, an attitude scale towards mathematics, a mastery goal orientation scale, a self-regulated learning scale, and a math test. The data analysis method used Structural Equation Modeling (SEM) with the SPSS-AMOS program.

RESULTS AND DISCUSSION

A. Confirmatory Analysis Results

The following are the results of the confirmatory factor analysis of the research variables:

1. Parental Support
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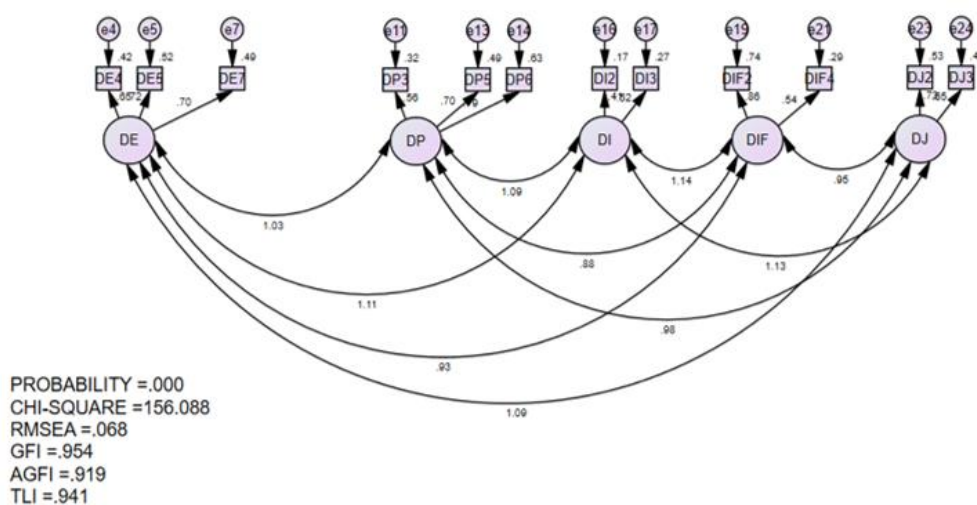


Figure 2. CFA Results 5 Factors from Parental Support

The test of the 1 and order CFA analysis for the parental support scale in the final results displays indicators with loading factor values above 0.5, namely indicators represented by 12 items with variations in loading factor

values above 0.5. The suitability of the variables in the 1 st Order CFA test results can be seen from the goodness of fit (GoF) value in the table below:

Table 1. GoF Structural Model of Parental Support Scale

Fit Index	Fit Criteria	Results	Conclusion
CHI-SQUARE	Expected small	156.088	Fit
RMSEA	0.08	0.068	Fit
GFI	0.90	0.954	Fit
AGFI	0.90	0.919	Fit
TLI	0.90	0.941	Fit

Source: Results of Data Processing with AMOS

The goodness of fit structural model of parental support has met the GoF standard, which means fit

(good) (Khuzaini & Santosa, 2016).

2. Attitude towards Mathematics Lessons

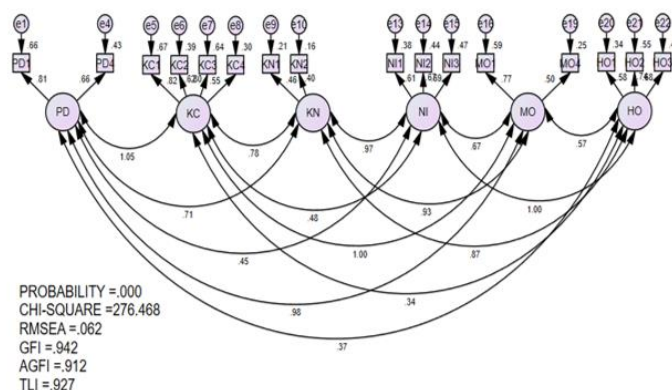


Figure 3. CFA Results 6 Factors of Attitude towards Mathematics Lessons

The test of the 1st order CFA analysis for the attitude scale towards mathematics in the final results displays indicators with loading factor values above 0.5, namely indicators that are

represented by 9 items with variations in loading factor values above 0.5. The suitability of the variables in the results of the 1st order CFA test can be seen from the goodness of fit (GoF) value in the table below:

Table 2. GoF Structural Model of Attitude Scale towards Mathematics Lessons

Fit Index	Fit Criteria	Results	Conclusion
CHI-SQUARE	Expected small	276,468	Fit
RMSEA	0.08	0.062	Fit
GFI	0.90	0.942	Fit
AGFI	0.90	0.912	Fit
TLI	0.90	0.927	Fit

Source: Results of Data Processing with AMOS

The goodness of fit structural model of attitudes towards mathematics lessons that have met

the GoF standard value is defined as fit (good) (Khuzaini & Santosa, 2016).

3. Mastery Goal Orientation

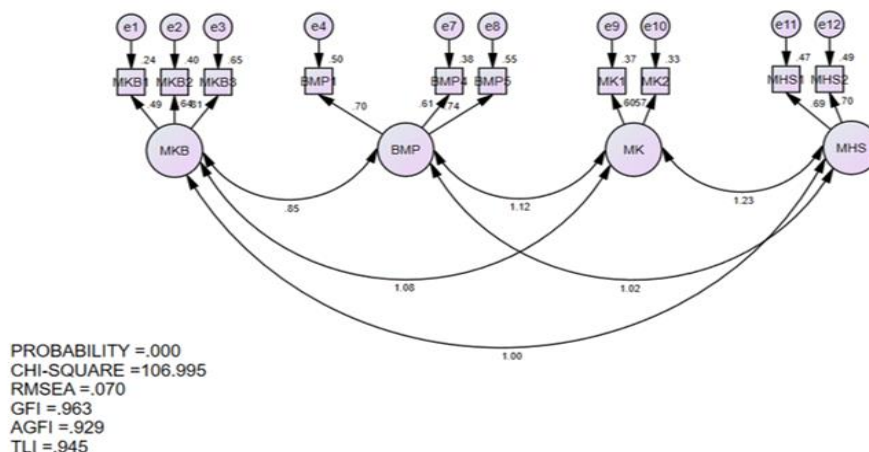


Figure 4. Results of CFA 4 Factors from Mastery Goal Orientation

The test of the 1st order CFA analysis for the mastery goal orientation scale in the final results displays indicators with loading factor values above 0.5, namely indicators represented by 10 items

with variations in loading factor values above 0.5. The suitability of the variables in the 1 st Order CFA test results can be seen from the goodness of fit (GoF) value in the table below:

Table 3. GoF Structural Model of Mastery Goal Orientation Scale

Fit Index	Fit Criteria	Results	Conclusion
CHI-SQUARE	Expected small	106,995	Fit
RMSEA	0.08	0.070	Fit
GFI	0.90	0.963	Fit
AGFI	0.90	0.929	Fit
TLI	0.90	0.945	Fit

Source: Results of Data Processing with AMOS

The goodness of fit structural model of mastery goal orientation has met the standard of GoF value

which means fit (good) ([Khuzaini & Santosa, 2016](#)).

4. Self-Regulated Learning

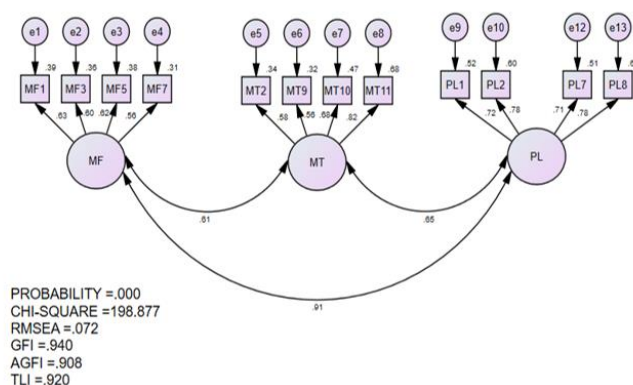


Figure 4. CFA Results 3 Factors from Self-Regulatory Based Learning

The test of the 2nd order CFA analysis for learning based on self-regulation in the final results displays indicators with loading factor values above 0.5, namely indicators represented by 12 items with variations in loading factor values above 0.5. The metacognitive

dimension is represented by four items, the motivation dimension is represented by four items, and the behavioral dimension is represented by four items. The suitability of variables in the results of the 2 and Order CFA test can be seen from the goodness of fit (GoF) value in the table below:

Table 4. GoF Structural Model of Learning Scale Based on Self-Regulation

Fit Index	Fit Criteria	Results	Conclusion
CHI-SQUARE	Expected small	198,877	Fit
RMSEA	0.08	0.072	Fit
GFI	0.90	0.940	Fit
AGFI	0.90	0.908	Fit
TLI	0.90	0.920	Fit

Source: Results of Data Processing with AMOS

The goodness of fit structural model of mathematics learning outcomes has met the GoF standard

value which is defined as fit (good) (Khuzaini & Santosa, 2016).

5. Math Achievement

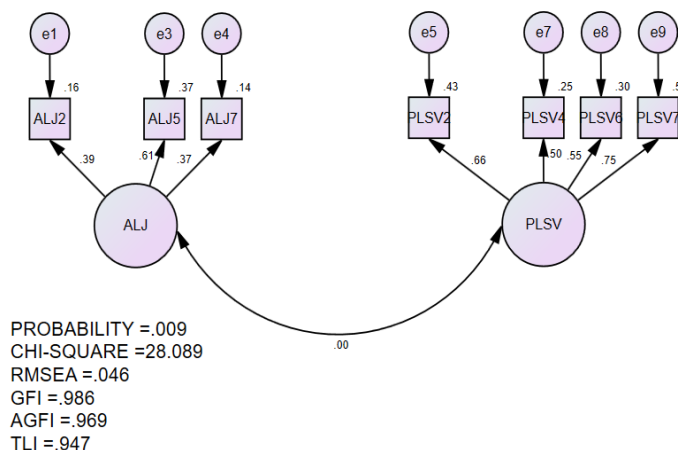


Figure 5. Mathematics Achievement Test

CFA analysis for the mathematics learning outcomes tests in the final results displays indicators with loading factor values above 0.5, namely indicators represented by 4 items with variations in loading factor values above 0.5. The algebraic

dimension is represented by 3 items and the PLSV dimension is represented by four items. The suitability of variables in the results of the 2 and Order CFA test can be seen from the goodness of fit (GoF) value in the table below:

Table 5. GoF Structural Model of Mathematics Achievement Test

Fit Index	Fit Criteria	Results	Conclusion
CHI-SQUARE	Expected small	28.089	Fit
RMSEA	0.08	0.046	Fit
GFI	0.90	0.986	Fit
AGFI	0.90	0.969	Fit
TLI	0.90	0.947	Fit

Source: Results of Data Processing with AMOS

The goodness of fit structural model of mathematics learning outcomes has met the GoF standard,

which means fit (good) (Khuzaini & Santosa, 2016).

B. Full Model Equation Estimation

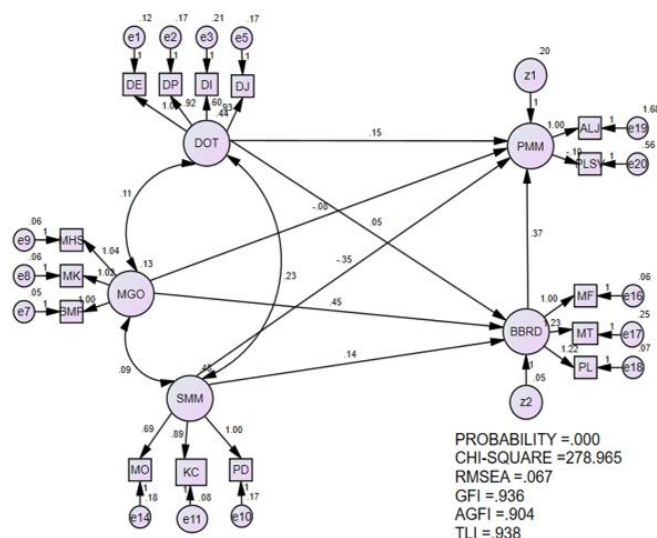


Figure 6. Structural Relationship Model

Based on the AMOS output above, in Figure 7 above, this structural equation model shows a chi-square value of 278,965. Likewise with other criteria values such as RMSEA, GFI, AGFI, and TLI. RMSEA 0.067 0.08, GFI 0.936 0.90, AGFI 0.904 0.90, TLI 0.938 0.90, it can be concluded that all criteria show fit.

The results show that parental support has a positive and significant effect on self-regulated learning, parental support has no effect on math achievement, and parental support has no effect on math achievement with self-regulated learning as a mediator. Attitudes toward mathematics lessons have a positive and significant effect on self-regulated learning, attitudes toward mathematics lessons have a negative and significant effect on mathematics achievement, and attitudes toward mathematics lessons have no effect on mathematics achievement with self-regulated learning as a mediator. Mastery goal

orientation has a positive and significant effect on self-regulated learning, mastery goal orientation has no effect on math achievement, and mastery goal orientation has no effect on math achievement with self-regulated learning as a mediator.

CONCLUSIONS

Based on the results of the research and analysis above, it can be concluded that parental support, attitudes towards mathematics lessons, and mastery goal orientation have a positive and significant effect on self-regulated learning. Meanwhile, parental support, attitudes towards mathematics, and mastery goal orientation do not affect mathematics achievement. Parental support, attitudes towards mathematics lessons, and mastery goal orientation have no effect on mathematics achievement with self-regulated learning as a mediator.

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