Effect of Self-Confidence and Self-Regulation on Mathematics Learning Outcomes of Class VI Islamic Elementary Students in Batangan District Pati

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Abstract: Determining the knowledge and skills of students are identified as aspects. The objectives of this study are 1) To identify the effect of self-confidence on the mathematics learning outcomes of Grade VI Islamic Elementary School (MI) students in Batangan Pati District, and 2) To identify the effect of self-regulation on mathematics learning outcomes for Grade VI Islamic Elementary School students in Batangan District. Pati, 3) To identify the effect of self-confidence and self-regulation on the mathematics learning outcomes of students of class VI Islamic Elementary School in Batangan Pati District. This research is a type of quantitative multiple linear regression research. The population in this study were all students of class VI Islamic Elementary School (MI) in the Batangan Pati sub-district, totalling 154 students. The sampling technique used in this study was simple random sampling with an error rate of 5%, so a sample of 110 students was obtained. Data collection techniques include questionnaires and description test questions. The data analysis technique used simple linear regression analysis and multiple linear regression. The results showed that 1) Self-confidence affected the mathematics learning outcomes of students of class VI Islamic Elementary School (MI) in Batangan Pati District by 42.3%, 2) Self-regulation has an effect on mathematics learning outcomes for students of class VI Islamic Elementary School (MI) in Batangan Pati District by 50.6%, and 3) Self-confidence and self-regulation simultaneously (together) affect the mathematics learning outcomes of students of class VI Islamic Elementary School (MI) in Batangan Pati District by 54%. This study concludes that there is a positive and significant effect of self-confidence and self-regulation either partially or simultaneously on the mathematics learning outcomes of class VI Islamic Elementary School (MI) students in Batangan Pati District.

Keywords: Mathematics learning outcomes, self-confidence, self-regulation

1.   Introduction

Self-learning is done so that students have good learning outcomes. Margareth (2021) states that quality education requires students' active role in every discipline's teaching and learning process, one of which is mathematics. Mathematics is one of the exact disciplines that teach about counting and needs to be proven true (Tanjung & Nababan, 2016). Tee, Leong, & Abdul Rahim (2021) stated that mathematics skills help students to make better sense of the world around them and possibly solve daily life problems; mathematics skills allow students to better understand the world around them and possibly solve problems of everyday life. One indication of the importance of mathematics appears that learning mathematics is one of the subjects given at every level of education (Papadakis, Kalogiannakis, & Zaranis, 2021). Mathematics has a crucial role in everyday life and in helping other fields of science (Sartika & Hadi, 2021). In line with Susanto's opinion Mukrimatin, Murtono, & Wanabuliandari, 2018), learning mathematics will teach us to think critically, creatively, and actively, which is needed by people in solving various problems.

Sunaryo (2017) states that students must have three aspects of abilities in learning mathematics: cognitive, affective, and psychomotor. Psychological elements are one supporting aspect that makes someone complete their tasks well. In addition, internal or psychological factors of students can influence their success in learning mathematics, one of which is self-confidence and self-regulation.

Self-confidence is a person's belief and attitude toward his ability by accepting it as it is, both positive and negative, which is formed and learned through the learning process to make himself happy (Pečiuliauskienė, 2020). According to Kunhertanti & Santosa (2018), self-confidence is a positive mental attitude of an individual who positioned or conditioned himself to evaluate themselves and their environment so that feels comfortable performing activities to achieve the planned goals. This means that the positive mental attitude of an individual who positions or conditions himself can evaluate himself and his environment so that he feels comfortable carrying out activities to achieve the planned goals. Therefore, self-confidence helps students persist and persevere when learning mathematics because they have reasonable confidence in their abilities (Harun et al., 2021).

Self-regulation (self-regulation) is a process in which students learn actively as regulators of their learning. With good self-regulation, students can make themselves directed and plan to do something easy to implement. Students' self-regulation when participating in teaching and learning activities at school can affect the student's ability (Hari, 2020). According to Birgisdottir, Gestsdottir, & Geldhof (2020), self-regulation is, therefore, likely to continue to provide foundations for further advances in math, directly and indirectly, through its influence on an essential math skill. Further in mathematics, directly or indirectly, through its impact on basic mathematical skills. Agreeing with Gunzenhauser & Saalbach (2020), which state that self-regulation is crucial for acquiring mathematical competencies in elementary school, self-regulation skills are essential to achieve mathematics competence in elementary school. Therefore, self-regulation in students must be reasonable and always sharpened.

The research results by Hasan et al. (2021) concluded that self-regulation, self-esteem and self-concept jointly affect students' mathematics learning achievement and also stated the same thing. In their research, Çiftçi & Yildiz (2019) found that self-confidence moderately affected mathematics learning outcomes. Differences between students' characteristics, where traits such as self-confidence have become one of the most important variables determining mathematics achievement. In line with the research results of Simanullang (2017), the variables of independence and self-confidence together have a positive and significant effect on increasing problem-solving skills, with a contribution of 68.7%. On the other hand, Danişman (2017), in his research results, stated that "self-regulation has a low-level positive effect on student achievement". This means that regulation has a positive but low influence on student achievement.

Based on the explanation above, it can be concluded that self-confidence and self-regulation have a positive contribution and a crucial role in student learning outcomes in any subject, including mathematics. However, most teachers only pay attention to the methods, models or learning media used in the classroom during learning. Teachers rarely pay attention to internal factors or psychological factors in their students. Some Islamic Elementary School (MI) teachers in Batangan Pati District have never measured the self-confidence and self-regulation of their students. Most of the time, teachers only pay attention to external factors in the learning process. Therefore, a study entitled "The Influence of Self Confidence and Self-Regulation on Mathematics Learning Outcomes of Class VI Islamic Elementary School (MI) students in Batangan Pati District.

1.1 Conceptual Framework

Internal and external factors influence mathematics learning outcomes. Internal characteristics, such as motivation, emotional intelligence, self-confidence, independence, and others, come from within oneself. At the same time, external factors come from outside oneself, such as facilities and infrastructure, environment, teachers, and teaching methods. One of the essential internal factors in improving mathematics learning outcomes is self-confidence and self-regulation (Yaniawati et al., 2020).

Students who have good self-confidence and self-regulation, then students can be successful in learning mathematics. Therefore, self-confidence and self-regulation can support students' motivation and success in learning mathematics. Students will tend to understand, find, and fight for the mathematical problems they face for the expected solutions (Hendriana, Johanto, & Sumarmo, 2018). This proves that the internal factors within the students, one of which is self-confidence and self-regulation, affect students' mathematics learning outcomes. How much do students believe that they can achieve maximum results with their abilities and self-regulation. The following illustrates the effect of self-confidence and self-regulation on mathematics learning outcomes.
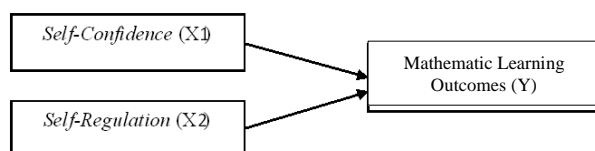

Figure 1. Thinking Framework

1.2 Research Objectives

This research was conducted 1) to identify the effect of self-confidence on mathematics learning outcomes for students of class VI Islamic Elementary School (MI) in Batangan Pati District, and 2) to identify the effect of self-regulation on mathematics learning outcomes for students of class VI Islamic Elementary School (MI) in Batangan Pati District, and 3) to identify the effect of self-confidence and self-regulation simultaneously on the mathematics learning outcomes of class VI Islamic Elementary School (MI) students in Batangan Pati District. The data collected will be used as a basis for exploring research data on the effect of self-confidence and self-regulation on mathematics learning outcomes.

2. Literature Review

Self-regulation in learning is defined as the techniques students employ to manage their knowledge resources as well as their cognition (using cognitive and metacognitive techniques). Self-regulation incorporates many elements of learning theories and can direct students in their efforts to pursue academic objectives by exercising self-control over their ideas, behaviours, and emotions (Labuhn, Zimmerman, & Hasselhorn, 2010). Self-regulatory learners are better able to understand who they are and how best to learn. Students are aware of their preferred learning style, what is simple and challenging for them, how to get beyond the challenges, what their hobbies and abilities are, and how to best utilise their strengths. From a motivational standpoint, learners will feel competent and capable, have confidence, and be independent.

Students with self-regulation skills may control, regulate, and enhance their cognitive capacities as desired. These students will develop independent learning skills as a result of improved self-control because they will be able to control their behaviour, engage in independent learning, observe conditions, and deal with challenges that may arise from a variety of lessons, all of which have varying degrees of difficulty (Blair, 2015). Student self-control will enhance learning environments and can meet requirements for clarity, subject matter mastery, diversity of material received at all times, use of ideas and creativity in problem-solving, instructional integrity, asking questions during the learning process, and enthusiasm for learning (Cleary, Velardi, & Schnaidman, 2017). Following the lessons, success in understanding, processing, and completing the activities assigned will, of course, have significant effects on the process of realising learning success.

Meanwhile, student confidence is one factor that affects how students learn mathematics, because a student's level of confidence might impact how they learn. The fundamental ingredient for success in all endeavours, including mastering mathematics, is self-confidence. The degree to which students are confident in their ability and willingness to complete assignments influences how such assessments are made.

Providing opportunity for kids to fully explore is one method to boost their self-confidence, claims Amiyani & Widjajamti (2019). Students should be involved in their own learning by examining their talents. Similar to Fadly & Harta (2018), who found that immersing pupils in all learning processes can help them gain more self-confidence. Students are required to have a propensity to see mathematics as something that can be understood, believe that studying mathematics diligently and tenaciously will yield results, and feel that mathematics is something valuable. They are also expected to perform as effective students. However, in practise, many pupils struggle to grasp mathematics because of their lack of confidence. For instance, when asked by the teacher to do assignments in front of the class while their friends watch, some pupils tend to be less intellectual, easily shaken, apprehensive, and fearful (Jain & Doswon, 2009).

One of the subjects taught in Indonesian schools is mathematics. Solving issues in common mathematics is one of the many uses of mathematics as a science. According to Maharani (2017), pupils can overcome common difficulties by having a strong understanding of mathematics. Due of this, it is crucial for students to learn mathematics, especially when it comes to problem-solving. Most students find it difficult to work on difficulties, therefore they avoid standing up in front of the class and asking classmates who are more competent to solve their arithmetic problems for them. Students always give up easily or are pessimistic when they are unable to solve arithmetic problems that are seen as tough, which makes it more likely that students would believe the outcomes of their peers' work.

3. Methodology

3.1 Research Design

This type of research is field research. The approach used in this research is quantitative. In this study, direct research was conducted at Islamic Elementary School or Madrasah Ibtidaiyah (MI) throughout Batangan Pati District, which focused on class VI to obtain concrete data about self-confidence and self-regulation in students' mathematics learning outcomes. This research design is a dual paradigm with two independent variables, namely self-confidence and self-regulation and one dependent variable, namely the results of learning mathematics.

3.2 Respondents

The population in this study were all students of class VI Islamic Elementary School (MI) in Batangan Pati district,

totalling 154 students. The sampling technique is simple random sampling because the samples are taken from the same class, namely class VI. Therefore, the Krecjie table to calculate the sample size needed in this study, with an error rate of 5%, obtained a sample of 110 respondents (Sugiyono, 2014).

3.3   Data collection technique

The data collection technique in this study used a questionnaire and a test. Questionnaires are used to measure self-confidence and self-regulation. The test is used to measure students' mathematics learning outcomes. The data collected were analyzed using simple linear regression and multiple linear regression to provide evidence of the effect of self-confidence (X1) and self-regulation (X2) on mathematics learning outcomes (Y) either partially or simultaneously.

4.   Findings and Discussion

Before the data was processed using multiple linear regression, prerequisite tests were first performed, which included the normality test, multicollinearity test, heteroscedasticity test, autocorrelation test, and linearity test.

Normality testing was carried out using the Kolmogorov Smirnov test with the help of SPSS 19. The data could be normally distributed if the significant value was > 0.05 (Gupta & Kapoor, 2020). Based on calculations using the Kolmogorov Smirnov test, an important value of 0.392 was obtained, which means the sig value > 0.05. Therefore, it can be concluded that the data is normally distributed.

The multicollinearity test was carried out with the help of SPSS 19. The multicollinearity test was seen from the tolerance and VIF values. Based on the results of calculations using SPSS 19.0 the tolerance variable self-confidence (X1) is 0.454, it means 0.454 > 0.10. While the VIF value of self-confidence (X1) is 2.202, meaning 2.202 < 10. In the self-regulation (X2) the tolerance value is 0.454 (0.454 > 0.10) and the VIF is 2.202 (2.202 < 10). This shows that the two independent variables have a tolerance > 0.10 and a VIF value < 10 (Trenggonowati & Salma, 2020). It can be concluded that there is no multicollinearity between the independent variables of the regression model.

The glejser test carried out the heteroscedasticity test. In the glejser test, if the sig value is more than 0.05, there is no heteroscedasticity (Padilah & Adam, 2019). Based on calculations using the Glejser test, the self-confidence sig value is 0.122, and the self-regulation sig value is 0.967. It can be concluded that the significant value of the two independent variables is more than 0.05, so there is no heteroscedasticity.

The autocorrelation test was carried out using the Durbin Watson test. The output of SPSS 19.0 is known to have a Durbin Watson value of 1.876. The Durbin Watson test value will then be compared with the du table value at a significance level of 5%, with the number of respondents being 110 (N) students and the number of independent variables 2 (k). The value of the du table is 1.7262, so the limit is between du and 4-du (1.7262 and 2.2738). The DW value of 1.876 is between the two, namely du (1.7262) < DW (1.876) < 4-du (2.2738). Based on these calculations, it can be concluded that by the rules of decision-making, there is no autocorrelation in the regression model, so the regression model is feasible to use.

The linearity test was carried out with the help of SPSS 19. Based on the SPSS 19.0 test, it can be seen that the sig value of 0.290 is more significant than 0.05. That means there is a linear relationship between the independent and dependent variables.

After going through the prerequisite test, data analysis was carried out, which included simple linear regression and multiple linear regression using SPSS 19 to prove the effect of self-confidence and self-regulation either partially or simultaneously on the learning outcomes of students of class VI Islamic Elementary School (MI) in Batangan Pati District.

The partial or simple regression test of each independent variable on the dependent variable was carried out by the t-test. Based on the output coefficients, it is known that the t value for the self-confidence variable is 8.898 > t table 1.984 and the value of sig. 0.000 <0.05, so it can be concluded that there is an effect of self-confidence on mathematics learning outcomes. The value of t count on the self-regulation variable is 10.512 > t-table 1.984 and the value of sig. 0.000 <0.05, so it can be concluded that there is an effect of self-regulation on mathematics learning outcomes. In the summary model output, it is known that the R-value for the self-confidence variable is 0.650 and the R2 value 0.423(42.3%). In contrast, the R-value on the self-regulation variable is 0.711 and R2 0.506 (50.6%). This, it can be interpreted that the two independent variables partially have a strong and significant influence on the mathematics learning outcomes of students of class VI Islamic Elementary School (MI) in Batangan Pati District. The following is a summary of the simple regression test for the effect of self-confidence and self-regulation on mathematics learning outcomes.

Table 1. Simple regression results

Reg.	t	Sig.	R	R^2	Conclusion
$X_1 \to Y$	8.898	0.000	0.650	0.423	Positive and Significant Effect
$X_2 \to Y$	10.512	0.000	0.711	0.506	Positive and Significant Effect

Based on the coefficient table states that the multiple regression equation models in estimating the mathematics learning outcomes of class VI MI students in the District Batang Pati, which are influenced by self-confidence and self-regulation, are:

$$Y = 36.631 + 0.237 X_1 + 0.327 X_2 \qquad (1)$$

Where X1 is self-confidence and X2are self -regulation, and Y is the variable of mathematics learning outcomes for class VI in Batangan Pati District. The equation can be translated as a constant of 36.631, meaning that the consistent value of the learning outcome variable is 36.631. Regression coefficients X1 and X2 of 0.237 and 0.327 state that for every 1% addition to the value of self-confidence and self-regulation, the value of mathematics learning outcomes increases by 0.237 and 0.327, respectively. The regression coefficient is positive, so it can be said that the direction of the influence of the variables X1 and X2 on Y is positive.

The next step is simultaneous testing. Based on the output, it is known that the significance value for the effect of X1 (self-confidence) and X2 (self-regulation) simultaneously on Y (mathematical learning outcomes) is $0.000 < 0.05$ and the calculated F value is $62.833 > F$ table 3.07, so it can be concluded that there is an effect of self-confidence and self-regulation simultaneously on the mathematics learning outcomes of class VI Islamic Elementary School (MI) students in Batangan Pati District.

The output model summary shows that the correlation/relationship (R) value is 0.735. From these results, it can be interpreted that there is a strong influence between self-confidence and self-regulation on the mathematics learning outcomes of class VI Islamic Elementary School (MI) students in Batangan Pati District. The magnitude of the effect can be seen from the value of R^2 (R square), which is 0.540 or 54%. Therefore, it can be interpreted that there is a strong relationship between self-confidence and self-regulation in the mathematics learning outcomes of class VI Islamic Elementary School (MI) students in Batangan Pati District, which is 54%. The remaining 46% is influenced by other variables that are not included in this research model.

The following is a summary of the multiple regression test of the effect of self-confidence and self-regulation on mathematics learning outcomes.

Table 2. Multiple regression results

Reg.	R	R^2	F	Sig.	Conclusion
X₁X₂→Y	0.735	0.540	62.833	0.000	Positive and Significant Effect

The following analysis is to find the contribution of predictors. The predictor contribution is used to find out how much (what %) the contribution of the influence given by each independent variable (X1 and X2) to the dependent variable (Y) (Pandis, 2016). There are two predictor contributions: the effective contribution (SE) and the relative contribution (SR). Based on the SPSS output of multiple linear regression, the summary of the results of the correlation and regression analysis is as follows:

Table 3. Summary of correlation and regression analysis

Variable	Regression Coefficient (Beta)	R	R^2
X₁	0.275	0.650	54
X₂	0.508	0.711	

Based on the calculation results, it can be seen that the variable self-confidence (X1) to mathematics learning outcomes (Y) is 17.9%. Meanwhile, the effective contribution (SE) of self-regulation (X2) to mathematics learning outcomes (Y) is 36.1%. Thus, it can be concluded that self-regulation (X2) has a more dominant influence on the Y variable than self-confidence (X1). As a result, variable self-confidence (X1) to mathematics learning outcomes (Y) is 33.1%, and variable self-regulation (X2) to mathematics learning outcomes (Y) is 66.9%.

The findings in this study regarding the effect of self-confidence on mathematics learning outcomes are that there is a positive and significant effect on mathematics learning outcomes for students of class VI Islamic Elementary School (MI) in Batangan Pati District. Following the opinion of Amir et al. (2021), who stated that self-confidence would affect the actions, efforts, perseverance, flexibility in differences, and the realization of goals of this individual, that self-confidence related to one's ability often determines the outcome (results) before the action occurs. Bandura & Hall's research (2018) mentions that confidence or self-confidence is related to academic success (Amir et al., 2021). In line with Yıldırım's (2019) opinion, her research states that self-confidence appears to be the strongest predictor of mathematics achievement. Therefore, self-confidence is the strongest predictor of learning achievement in mathematics. Çiftçi & Yildiz (2019) concluded that self-confidence affected mathematics learning outcomes, but the effect was moderate.

The findings in this study regarding the effect of self-regulation on mathematics learning outcomes are that there is a positive and significant effect on mathematics learning outcomes for students of class VI MI in Batangan Pati District. By the opinion of Zimmerman (2002) in Risnawati et al. (2019), self-regulation refers to thoughts, feelings and actions that are planned and adjusted to achieve goals. Independent learning is used to master certain materials and or competencies so that they can be used to solve problems encountered in learning (Risnawati et al., 2019). However, a similar opinion was expressed by Danişman (2017) that self-regulation has a low positive effect on student achievement, which means that self-regulation has a positive influence but a low influence on student achievement. In addition, another opinion put forward by Gunzenhauser & Saalbach (2020) stated self-regulation in the mathematics domain contributed to concurrent mathematics performance, which means that self-regulation in mathematics learning contributes to students' mathematical performance.

The findings in this study regarding the effect of self-confidence and self-regulation simultaneously (together) on mathematics learning outcomes are that there is a positive and significant effect on mathematics learning outcomes for students of class VI Islamic Elementary School (MI) in Batangan Pati District. In line with the research results of Mashlihah & Hasyim (2019), it can be concluded that there is a significant effect between self-esteem, self-regulation, and self-confidence simultaneously on mathematical problem-solving abilities. The higher the self-confidence and self-regulation, the higher the mathematical problem-solving ability.

5.   Conclusions and Recommendations

The conclusions from this study are that there is a positive and significant influence, either partially or simultaneously, on self-confidence and self-regulation on mathematics learning outcomes. Partly, self-confidence has an effect of 42.3% on students' mathematics learning outcomes. Self-regulation has an impact of 50.6% on students' mathematics learning outcomes. Meanwhile, simultaneously self-confidence and self-regulation contributed 54% to students' mathematics learning outcomes. Self-regulation contributes more dominantly than self-confidence.

Teachers should not only pay attention to methods, models, or learning media but also pay attention to the psychological factors of students participating in learning activities. These psychological factors are self-confidence and self-regulation, which also contribute to student learning outcomes.

Acknowledgement

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