Intensifying Self-Efficacy and Locus of Control to Student's Mathematics Academic Attainment

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Abstract.

Mathematics is a universal science that benefits humans. It serves as a basis of knowledge for understanding concepts in other disciplines, such as science, accounting, economics, engineering, and aerospace. It also improves illogical reasoning, imaginative problem-solving, analytical problem-solving, and inadequate communication abilities. The study will analyze the influence of self-efficacy and locus of control on the mathematics learning outcomes at South Jakarta State High School with a sample size of 540 students. We conducted Statistical analysis with path analysis through Smart-PLS. The result showed that self-efficacy and locus of control directly influence the student's mathematical learning outcomes, self-efficacy directly affects the locus of control, and self-efficacy indirectly influences students' mathematics learning outcomes positively through the locus of control. Thus, self-efficacy among junior high school students should be enhanced through additional curricular programs, i.e., student character development in the school.

Keywords: self-efficacy; locus of control; mathematics academic attainment; Smart-PLS

1. Introduction

Achieving academic success with high-value indicators is one of the goals of students and parents. That is a good thing for both students and the educational system. Thus, we need to identify the factors that affect academic success. Mathematics teaching in Indonesia is on the curriculum at all levels of education. Since kindergarten, mathematical material has already been started by identifying symbols of numbers and names of numbers. Then it continued at the elementary school level with number operations. The problem begins with a number operation, i.e., not all students can master the number operation, primarily if it is associated with a fractional number. [1] stated that the operation of fractional numbers and the simplification of fractions had already caused problems for primary school kids learning mathematics. The following mathematics learning material will go over these challenges.

Students will feel anxious in facing math subjects. Persistent anxiety will result in low self-efficacy [2]

Additionally, students' locus of control when working on mathematical problems is crucial, particularly in formative or summative exams, so they can confidently work on test questions without needing assistance from others or even resorting to cheating. Students who have individual control and believe in their success have a strong locus of internal control [3].

Previous research on self-efficacy, locus of control, and academic accomplishment showed that student's self-efficacy has a positive influence on students' locus of control [4], that students' self-efficacy has a positive effect on Mathematics achievement[6], [7]; and locus

of control influences academic achievement [8]; [9]. Other researchers stated that there was no effect of self-efficacy [5]. The results of other studies likewise supported the idea that student academic achievement cannot be predicted by locus of control [10]. This study is entitled: Intensifying Self-Efficacy and Locus of Control on Students' Mathematics Academic Attainment. The study aims to confirm the contradictions of previous research results and answer the following investigation questions:

1. Do locus of control and self-efficacy affect students' mathematics learning outcomes?
2. Is there an influence of locus of control on self-efficacy?
3. Does locus of control influence students' mathematics learning outcomes through self-efficacy?

Self-efficiency is an individual's self-assurance related to the competence to establish and complete a task to conclude a target, crop object, and appliance actions to a particular competence. People with higher levels of self-efficiency than usual will survive when facing difficulties [11]. Self-efficacy is self-confidence and independence in doing something. [12]. The self-efficiency of teachers is based on experience, either in the form of success or failure in a particular situation. [13]. Self-efficacy is the key to a student's success in achieving academic achievement [14]; [6];[15]. The hypothesis of our research is as follows:

H-1: SE has a significant impact on the LC.

The locus of control is the individual's control of work and confidence in self-success. [16]; [9]. The territory valuable for the students' locus of control is a continuum between two high and low values. [3]; [17]. There are a couple types of locus of control, i.e., internal and extraneous [18]. The locus of control of a student can enhance his learning success [19]. Individuals with a high locus of control have the confidence to succeed in their endeavors because they are convinced there is a close relationship between efforts and outcomes [20]. The research hypothesis is:

H-2: SE has a positive impact on SMA.

Student Mathematics Achievement (SMA)

Learning achievement is the result of the interactive cognitive processes of students under the guidance of teachers, parents, and peers [21]. Students have peculiarities that expedite skills acquisition and expand their competence to obtain learning outcomes [22]. Academic achievement is closely related to confidence and self-concept [6]. The research hypotheses are:

H-3: LC has a positive direct impact on SMA

H-4: SE has a significant indirect effect on SMA through LC.

2. Method

Using PLS-SEM software, the researcher conducted route analysis to examine quantitative study data. The learning achievement was measured by answering 20 essay questions with varying subject matter. At the same time, the research data were gathered using questionnaires on variable self-efficacy and locus of control. The instrument employed in this study is set up according to indicators of each variable, each of which is made up of several components. The maximum value of each item is five. The two variables each have five barometers, and the application is arranged by a barometer of the variables to be

examined. There are 40 items total in this study, with each barometer consisting of four assertions with a range of values ranging from 1 (extremely disagree) to 5 (strongly agree). The study's sample comprised 540 pupils from South Jakarta's state high schools. Each person has an equal chance of joining the sample because the sampling process uses random sampling. The Smart-PLS bootstrapping approach was used to examine the validity and reliability of the investigational instruments before any hypotheses were made. The investigation will take place from January 2023 through May 2023. Questionnaires must pass validity and reliability checks before being used in research. Invalid results are not used.

Several teachers teaching at construction schools who had formerly held arrangement meetings for research preparation assisted with the instrument delivery. Of the 600 respondents who answered promptly and precisely, 540 responded. The research groundwork model is shown in Figure 1.

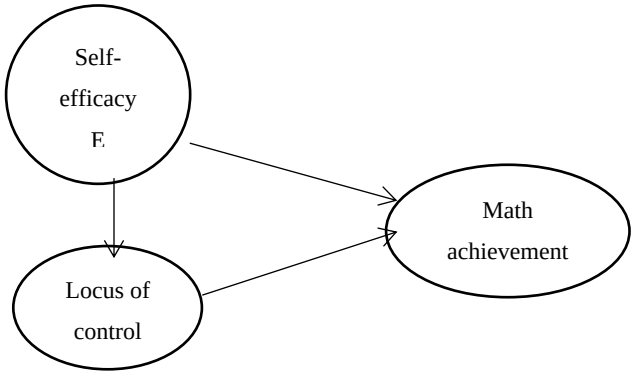

Fig. 1 Research Framework

3. Result and Discussion

Smart-PLS is used to verify the validity and dependability of every item in the exam. If the statement is true, the instrument is prepared for additional analysis. Utilizing Smart PLS for instrument validity assessment demonstrated that valid instruments meet the r > 0.70 requirement. Three of the 60 items on the instruments need to be corrected. Table 1 displays the reliability test outcomes of the computation using bootstrapping Miniatur Smart-PLS.

TABLE 1 The Variables Reliability

Elements	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
LC	**0.969**	**0.971**	**0.628**
SE	**0.969**	**0.971**	**0.628**
SMA	**0.966**	**0.969**	**0.611**

Based on the calculations in Table 1, the researchers definite that all indicators consistently measured their construction because Cronbach's Alpha and Composite reliability values were r>0.70 and Average Variance Extracted (AVE) had r>0.050 values. Afterwards, the statistical investigation results of direct and indirect impact are verifiable by bootstrapping the Smart-PLS model, as shown in Table 2.

TABLE 2 The Hypothesis Research Result

Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistics	P-Values
SE → LC	0.795	0.794	0.020	40.098	**0.000**
SE → SMA	0.247	0.247	0.020	12.207	**0.000**
LC → SMA	0.705	0.705	0.019	38.064	**0.000**
SE → LC → SMA	0.61	0.560	0.021	26.088	**0.000**

The outcome of the test of the Table 2 hypothesis in this study has shown that there is a direct and indirect influence due to the p-value value <.05 (.000). Hypothesis 1: There is a positive direct influence of SE on the locus of control; hypothesis 2: SE on the results of mathematics studying; hypothesis 3: LC on the learning outcome; and hypothesis 4: SE has a significant indirect influence on the outcome of the mathematics learning. The analysis results simultaneously answer the research question, which is the purpose of this study. Additionally, the investigation results are backed by the impeachment of several previous researchers who stated that SE affects the LC in students at Turkish universities. [14] [24]; SE has a positive impact on student academic achievement [12]; [25]. LC influences academic achievement in high school students [9]; [16]. There is also an indirect influence on performance from the LC as an intervening variable. [26].

Further analysis was carried out by comparing the direct influence of exogenous variables on endogenic variables: the magnitude of the direct impact of SE on student mathematical learning outcomes (p-31), which is 0.247 x 0.257 = 0.0610 or 6.10%. Then the size of the direct influence of the LC on the student's mathematical learning results (p-32) is calculated and obtained as 0.705 x 0,705 = 0.5288 or 52.88%. The size of the influence is p-32 > p-31. Thus, the impact of the LC on the student's mathematical learning outcomes is more significant than the influence of SE on the students' mathematics learning outcomes. Similarly, the statistical t-value p-32 > p-31 is 38.064 > 12,207. Students' LC at the first high school in South Jakarta can be associated with the success of character education in the school.

Furthermore, we compared the magnitude of the indirect influence of student SE through the LC on the learning outcomes of Mathematics (p-321) = p-21 x p-32 =.795 x.705 =.5605 or 56.05 %. While the magnitude of the direct impact of students' SE on the study outcome of mathematics (p-31) = so that the magnetism of the influence is p-321 > p-31 (56.05% > 6.10%). Therefore, we can conclude that the locus of student control as an intervening variable effectively influences the learning outcomes of mathematics. The LC is crucial for the students to feel that their personal decisions and efforts will guide them to successful lives [27]; [18].

Self-efficacy is the conviction that one can carry out an activity or accomplish a goal. It includes a person's self-assurance in their ability to manage their conduct, have an impact on their surroundings, and remain motivated in the pursuit of their objective. Self-efficacy is essential in supporting students' learning success, especially in achieving mathematical learning outcomes. Students are generally reluctant to study mathematics due to a lack of confidence to initiate learning. Strengthened by an internal and external locus of control, students dare to embark on a challenge. The results of this study and several other researches

have proven the positive influence of self-efficacy and locus of control on students' academic achievement in mathematics.

4. Conclusion

Analyzing exogenous variables' impact on endogenous variables has yielded significant insights. Notably, Self-Efficacy (SE) and Locus of Control (LC) have a distinct direct influence on mathematical learning outcomes. Additionally, SE exerts influence on LC, leading to an indirect effect of SE on mathematical learning outcomes through LC.

Moreover, the study identifies LC as an intervening variable that indirectly contributes to mathematical learning outcomes. These discoveries emphasize the necessity of a follow-up program to bolster students' SE through extracurricular activities. This program bears significance in nurturing the character of students, who represent the forthcoming generation of our nation.

It is imperative to acknowledge that while the findings of this research are valuable, they are constrained by the limited sample size, which only represents specific regions within Indonesia. Consequently, the generalizability of these results is restricted. Nevertheless, these findings catalyze future researchers to analyze additional variables influencing mathematical learning outcomes.

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