

The Effect of Self-Efficacy and Learning Independence on Students Mathematical Reasoning Ability (Survey at Class VII Public Junior High School in Bekasi City)

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KEYWORDS

Self-Efficacy; Learning
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ABSTRACT

The purpose of the research is to determine 1) Direct influence of self-efficacy on students' math reasoning ability 2) the Direct influence of learning independence on the ability of mathematical reasoning 3) the Direct influence of self-efficacy on student self-reliance 4). The indirect effect of self-efficacy on mathematical reasoning ability through student learning independence. This research used a survey method. The independent variables bound to this research are Self Efficacy (X1), Learning Independence (X2), and Mathematical Reasoning Ability (X3). The research method used surveys. The sample used is 100 students as a research sample by using a proportional random sampling technique from all students of class VII of National Junior High School in Bekasi City. The data were collected using math-reasoning test and self-efficacy questionnaire and learning independence. Hypothesis testing with path analysis (Path Analys). This study was conducted in January 2018. Based on the results of the hypothesis and data analysis concluded several things as follows (1) There is a direct influence of self-efficacy significant to the ability of mathematics reasoning of students of National Junior High School in Bekasi City. This is evidenced by the acquisition of $t_{count} (4.615) > t_{table} (1.984)$. (2) There is a significant direct influence of learning independence to the students' math skills ability in National Junior High School in Bekasi City. This is evidenced by the acquisition of $t_{count} (5.869) > t_{table} (1.984)$. (3) There is a direct influence of self-efficacy significantly to the independence of students studying National Junior High School in Bekasi City. This is evidenced by the acquisition of $t_{count} (18,719) > t_{table} (1,984)$. (4) There is

a significant indirect influence of self-efficacy of students to the ability of mathematical reasoning through the independence of students studying National Junior High School in Bekasi City. This is evidenced by the acquisition of $t_{count} (6.4728) > t_{table} (1.984)$. The implications of this research are 1). To improve the ability of mathematical reasoning can be done by improving self-efficacy and student learning independence. 2) to improve learning independence is done by improving self-efficacy.

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1. Introduction

Education is a very important and essential issue for every individual. A nation is considered advanced if the quality of education is also advanced. Education has a purpose, one of which is to create reliable and needed Human Resources to fill today's development. Education can change people both in thinking, feeling and doing. Therefore, Education can change the civilization of a more advanced society. In order to achieve integrated learning outcomes involves several components such as, students who have IQ, interests, talents. Good psychological factors, ability, motivation, attitude, maturity, discipline and others.

One of the objectives of mathematics subjects in school is to utilize thinking on designs and properties, perform scientific controls in making generalizations, developing proofs, or clarifying numerical thoughts and articulations. This is also supported by the statements of *Ball Lewis* and *Thamel* in *Fetty* (2020, p. 5). That "*mathematical reasoning is the foundation for the construction of mathematical knowledge*". This means that mathematical reasoning is the foundation for obtaining or constructing mathematical knowledge. Thus, mathematics teachers should be able to develop students' reasoning skills in the mathematics learning process, but the reality in the field of students' reasoning abilities is still lacking.

Students may take maths instruction for granted in school, without questioning why or for what maths should be taught. In detail, *Wahyudin* in *Usniati* (2011) found that there is a tendency that causes a number of students to come up short of acing well the subjects of science, to be specific understudies need understanding and utilize great reason in tackling the issues given.. This shows that mathematics emphasizes activity in the world of ratios (reasoning) and the question is how a teacher instills concepts best in students.

Self-efficacy is a person's beliefs about his or her abilities to cope with various situations that arise in his life (*Ghufron & Suminta*, 2013). Self-efficacy in general is not related to the skills he has but is related to the taste that the individual believes about what can be done with the skills he has no matter how great. Self-efficacy will affect several aspects of a person's cognition and behavior. Therefore, the behavior of individuals will be different from other individuals.

Learning independence is learning that is done with little or no outside help. Independence means a condition in which a person can meet his own needs and be free from dependence from others and the presence of internal encouragement and the desire to learn on his own (*Sobri*, 2020). So that independent learning does not mean learning alone, but a learning principle that relies on the

activities and responsibilities of students themselves, not the orders or recommendations of others and in practice still needs guidance from educators.

Learning independence is an important factor that must be owned by students in the learning process both at school and at home and will improve the quality of student learning (Afiani, 2017; Aini & Taman, 2012; Fitriana et al., 2015; Kusmayanti, 2020). Because in learning followed by independence, students will carry out their learning activities with full responsibility, strong will and have high discipline so that the ability to understand the concept will be achieved to the maximum. In addition, the factor that can affect reasoning ability is interest because students are required to have a high willingness and interest in learning that is able to provide and realize the hopes and desires of all parties.

The purpose of the study is to find out 1). Direct influence of self-efficacy on students' mathematical reasoning ability 2) Direct influence of learning independence on mathematical reasoning ability 3) Direct influence of self-efficacy on student learning independence 4). Indirect influence of self-efficacy on mathematical reasoning ability through student learning independence.

2. Materials and Methods

The approach used is quantitative research with correlational survey research techniques. The data collection used was a questionnaire for variables of self-efficacy and learning independence as well as tests for mathematical reasoning skills given to 100 students of public junior high school in Bekasi City. The analysis technique used in this study is Path Analysis (path analysis). Path analysis is a technique developed from multiple linear regression. Used to test the magnitude of the contribution indicated by the path coefficients in each path diagram of the causal relationship between variables X_1 and X_2 to Y and their impact on Z (Sugiyono, 2019).

The author concludes that the graphic study strategy is appropriate for utilize in this think about, since it is in agreement with the reason of the consider, which is to get an outline of the impact of self-efficacy and understudy learning autonomy on scientific thinking capacity. Some time recently conducting information examination on the impact of information factors, at that point information examination strategies utilizing inferential measurements basic relationship and numerous relationship, halfway relationship, and Way Examination or Way Investigation. Relationship requires a least of two factors, while Way Examination requires three factors. In this consider, the free variable was Self-Efficacy (X_1), Understudy Learning Autonomy (X_2) and the subordinate variable was numerical thinking capacity (Y).

The constellation of its research schemes can be described as follows:

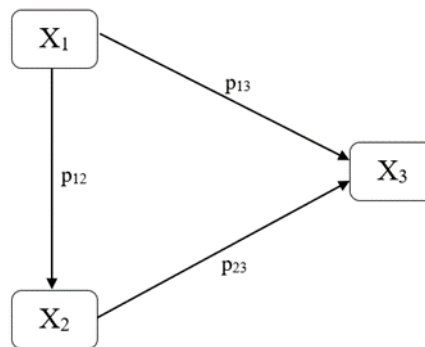


Figure 1 Patterns of Relationships between Variables

Information:

- X₁ : Self-efficacy
- X₂ : Learning independence
- X₃ : Mathematical reasoning ability
- p₁₂ : The effect of self-efficacy on learning independence
- p₁₃ : The Effect of Self-Efficacy on Mathematical Reasoning Ability
- p₂₃ : The effect of learning independence on mathematical reasoning ability.

3. Result and Discussion

The direct influence of self-efficacy on mathematical reasoning ability.

The research findings showed that the path coefficient X₁ to X₃ (P₃₁) was 0.413 and after being tested and calculated using SPSS 20 the effect was significant. This shows that there is a significant direct effect of self-efficacy (X₁) on the understanding of mathematical reasoning ability (X₃). The direct contribution of self-efficacy (X₁) to the understanding of mathematical reasoning ability is only (X₃) of **KD = P₁₃² × 100% = (0.413)² × 100% = 17.06%**. While the remaining **82.94%** were influenced by other factors beyond self-efficacy.

Based on the results of the calculations above, the results of the study are appropriate and in line with the submission of research hypotheses which state that there is a direct influence of self-efficacy on mathematical reasoning abilities. The results of the study proved the influence of self-efficacy on students' mathematical reasoning ability. Self-efficacy will increase students' maximum mathematical reasoning ability because it is driven by confidence in their abilities. This is in line with Bandura's synthesis theory in Dewi (2012, pp. 47–49), stating that self-efficacy, also known as social cognitive theory or social learning theory, refers to an individual's belief that he can do a task. This is supported by Julaeha's opinion (2021: 97) (Abdullah, 2016; Abdulwahab, 2014), "self-efficacy in the learning process is the ability of citizens to learn their cognitive abilities to complete tasks related to learning activities". Self-confidence determines in part the expectation of results, a person will be successful in a business because he expects successful results. Students who have high mathematical reasoning ability, have stronger beliefs. They strategize faster, solve problems faster, choose to rework problems they haven't solved, and do so more accurately than students with similar abilities whose efficacy is doubtful. In addition, self-efficacy affects achievement directly by increasing students' grade goals.

The direct effect of learning independence on mathematical reasoning ability

The research findings showed that the path coefficient X_2 to X_3 (P_{32}) was 0.525 and after being tested and calculated using spss 20 the effect was significant. This shows that there is a significant direct influence of learning independence (X_2) on the understanding of mathematical reasoning ability (X_3). The direct contribution of student learning independence (X_2) to the understanding of mathematical reasoning ability (X_3) is $KD = P_{23}^2 \times 100\% = (0.525)^2 \times 100\% = 27.56\%$. While the remaining **72.44%** is influenced by other factors outside Learning Independence.

In mathematical reasoning skills, students are required to have an independent attitude and actively create cognitive structures in the learning process, meaning that students need to have awareness, ability and independence in students to make learning efforts. Reasoning skills can be developed when students understand a concept (understanding), or discover and prove a principle. By the time students find cases in mathematics. So, students are accustomed to seeing the characteristics of several other cases, seeing patterns and making guesses about the relationships that exist between them. For this reason, students are expected to have high learning independence in order to learn more optimally, besides that they must also be creative and skilled in developing mathematical reasoning skills well solving problems and other problems Suripto (2019:34) (Supardi, 2013).

The Direct Effect of Self-Efficacy on Learning Independence

The research findings showed that there was a path coefficient X_1 to X_2 (P_{21}) of 0.884 and after being tested and calculated using spss 20 the effect was significant. This shows that there is a significant direct influence of learning independence (X_1) on learning independence (X_2). The direct contribution of self-efficacy (X_1) to learning independence (X_2) is $KD = P_{12}^2 \times 100\% = (0.884)^2 \times 100\% = 78.15\%$. While the remaining **21.85%** is influenced by other factors.

In Rogers' concept, it is called self since the self is the substance of freedom. Understudies who have high self-efficacy will be empowered not to depend on others. So within the conclusion, it tends to be a free person in learning. In expansion, somebody who has tall self-efficacy tends to have cautious arranging, has diligence, takes activity in finding learning assets, is certain and not effortlessly discouraged, can set accomplishment targets, can think emphatically, and want not to depend on others.

Based on the information and calculation results above, the research results are appropriate and in line with the submission of research hypotheses which state that there is a direct influence of self-efficacy on learning independence. The results of the study proved the influence of self-efficacy on learning independence.

The indirect influence of self-efficacy on mathematical reasoning ability through learning independence

The research findings show that the coefficient of the indirect influence of self-efficacy pathway (X_1) on the understanding of mathematical reasoning ability (X_3) through learning independence (X_2) is determined from the product of the path coefficient X_1 to X_2 through X_3 , namely: $P_{21} \times P_{32} \times 100\% = 0.884 \times 0.525 = (0.4641)^2 \times 100\% = 21.54\%$. While the remaining 78.46% is influenced by other factors.

Gagne (Ruseffendi, 1998: 165) in (Kusmanto, 2013), that the indirect object of studying metamatics is so that students have problem-solving skills. From Gagne's opinion and the purpose of the Mathematics Curriculum, it can be concluded that to be able to solve a problem,

students need to have the ability to reason which can be obtained through learning mathematics. Reasoning in mathematics has a very important role in a person's thought process. Reasoning is also the foundation in learning mathematics. In case students' thinking abilities are not created, at that point for understudies arithmetic will as it were be fabric that takes after an arrangement of strategies and mimics cases without knowing their meaning. Mathematical fabric and numerical thinking are two things that cannot be isolated, to be specific scientific fabric is caught on through thinking and thinking is caught on and prepared through learning mathematical fabric.

Bandura in Seto Mulyadi (2016, p. 107) states that the biggest concern is when students no longer believe that they have the ability to complete academic tasks. This belief is called self-efficacy. Self-efficacy is very closely related to personality, a person can have the ability of self-efficacy in himself and has a strong personality in a certain action so that students who have high self-efficacy are able to make more diligent and enthusiastic in learning. The harder you study, the more knowledge in you student, the better the student's mathematical reasoning ability.

Self-efficacy and learning independence together have an influence on mathematical reasoning skills. Self-efficacy has an important role in mathematical reasoning because students' confidence in mathematics lessons will affect the achievement of learning achievement. In addition to self-efficacy, learning independence also affects mathematical reasoning skills. By learning all the time without certain conditions or without encouragement, students will be better prepared in mathematical reasoning. Efficacy and independence of learning are very important for students in overcoming phenomena that students should not do in learning such as cheating, quickly feeling bored in class, learning only during exams and passive during the learning process, especially mathematics learning.

4. Conclusion

In this conclusion segment, the creator briefly portrays the comes about of investigate gotten within the field can be drawn as follows: 1) There's a noteworthy coordinate impact of self-efficacy on the scientific thinking capacity of open junior high school understudies in Bekasi City. This can be prove by the securing of tcount values (4,615) > ttabel (1,984). 2) There's a noteworthy coordinate impact of learning independence on the numerical thinking capacity of open junior tall school understudies in Bekasi City. This can be prove by the securing of tcount values (5,869) > ttabel (1,984). 3) There's a noteworthy coordinate impact of self-efficacy on the learning freedom of open junior tall school understudies in Bekasi City. This can be prove by the securing of tcount values (18,719) > ttabel (1,984). 4) There's a noteworthy backhanded impact of students' self-efficacy on scientific thinking capacity through the learning autonomy of open junior tall school understudies in Bekasi City. This is often prove by the procurement of tcount values (6,4728) > ttabel (1,984).

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