Library Progress International *Print version ISSN 0970 1052*
Vol.44 No.3, Jul-Dec 2024: P.3874-3881 *Online version ISSN 2320 317X*

Original Article *Available online at www.bpasjournals.com*

Students Self-Efficacy in Solving Geometric Problems: Case Study in Private Junior High School in Malang City

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How to cite this article: Ovan, Yusuf Fuad and Mega Teguh Budiarto (2024) Students Self-Efficacy in Solving Geometric Problems: Case Study in Private Junior High School in Malang City. *Library Progress International*, 44(3), 3874-3881

ABSTRACT
This research aims to describe junior high school students' self-efficacy in solving geometry problems. Instruments include the Self-Efficacy Questionnaire (SEQ) and the Geometry Problem Solving Test (GPST). The research instrument has been validated by three senior lecturers with doctoral degrees in mathematics education. The readability test was carried out by two mathematics teachers and two students from State Junior High School in Surabaya, purposively selected class 9 of Junior High School Muhammadiyah 4 Malang City, consisting of 6 male students and 3 female students who were divided into low subject, medium subject, and high subject groups. The research results showed that low subjects were only capable at the analysis stage, but not at the exploration, planning, implementation, and verification stages. Medium subject is capable at the analysis and exploration stage, but not at the implementation and verification stage. High subjects are capable of all problem-solving indicators. Each subject has different self-efficacy, as well as geometry abilities. It is recommended that future researchers develop and test other subjects according to the education level of junior high school students.

Keywords: Self-Efficacy, Problems Solving, Geometry, Students, Private Junior High school

INTRODUCTION

Self-efficacy is a significant factor in behavior-inclined students' willingness to take on tough assignments, exert more effort, and persevere through hardship [1], [2]. In life humans, self-efficacy has proven to be a mediator and decider of results Study of math, science, and reading write, as well as become a decider of critical thinking and performance academic [3]. Self-efficacy is confidence in students to their abilities to organize and implement necessary action to produce achievements given by teachers, friends peers, and the environment [4]. Self-efficacy helps students determine choices, effort for progress, tenacity, and perseverance that students show in facing difficulty. Self-efficacy is defined as trusting a student to solve their problem and face it in the real world [5].

Students with high self-efficacy will say that himself capable of learning material provided in class and have trust that they can work with good [6]. Students with low self-efficacy will avoid the tasks given in the learning process. Student with high self-efficacy tends involved in solving problems and using more learning strategies well, while students with low self-efficacy tend to avoid in solution problems and use inadequate learning strategies [7]. Students who have self-efficacy the good one will act, think, and feel differently than students who have low efficacy [8], [9]. They are more persistent, more effective, and more self-managed [10].

The conviction that pupils can acquire and excel in mathematics is known as self-efficacy [11], [12]. A conviction that if one adopts particular behaviours, one will succeed in maths class. These beliefs, however, have been demonstrated to be a more accurate predictor of arithmetic performance than other belief constructions linked to mathematics [13], [14]. Furthermore, students that possess self-efficacy are guided and motivated. Students require far more self-control and drive to complete tasks when they lack confidence in their abilities to accomplish. Sadly, pupils have low self-efficacy. It is not sufficient to consider self-efficacy in terms of prior performance [15]. There are less capable pupils with varied

degrees of this belief, and other students are capable on their own with low and high efficacy [16], [17]. The next result of high self-efficacy is behavioural modifications that [18].

Three components can be used to quantify self-efficacy: general, strength, and magnitude [5], [19]. The degree of confidence the learner has in their ability to finish it is related to the magnitude dimension. When people are presented with issues ranked in order of difficulty, their beliefs will be restricted to the easiest, medium, and worst difficulties based on how well they believe they can do the behavioural requirements at each level. The apparent confidence in finishing a task or problem decreases with its level of complexity. The strength dimension pertains to the degree of strength or weakness in students' perceptions about their particular expectations of their talents or their perceived self-abilities. This dimension so shows how stable students' beliefs are about the level of difficulty of assignments that can be completed. This dimension is typically closely linked to the magnitude dimension, which describes how readily challenging events defeat pupils with low efficacy. Pupils who exhibit high efficacy in their competency, on the other hand, will persevere through challenges. In general, dimensions have to do with self-efficacy that occurs in specific domains or is applicable to a range of activities and circumstances. This component has to do with how broad the subject is or how well students are able to overcome obstacles or complete assignments under specific circumstances.

Furthermore, one of the materials related to problem-solving in mathematics learning is geometry [20], [21]. Geometry is a branch of mathematics that studies points, lines, angles, planes and shapes, and the physical shapes of the real world [11], [22]. A geometry problem is a task where students find it difficult to understand, analyze, and find the answer [23]. The technique of solving geometry problems is based on geometric principles that are presented in a non-routine way, making it difficult for pupils to figure out the solution or solve the problem [20]. Geometry problem solving is a process formulated based on geometric concepts that are presented in the form of non-routine problems so that students do not easily find the answers. Students who are learning geometry go through a process of solving issues until they are no longer problems [24], [25].

Students experience obstacles in solving problem geometry, this not only happened in Indonesia but also in other countries, the results study in the city of Bindura, Africa there are 1,000 junior high school students [26]. According to the study's findings, students generally had positive opinions about geometry's applicability and felt that it will be useful to them in their future jobs. 80% of students in Bindura City dislike tackling geometry problems other from that. That also occurs in Turkey. In Kirsehir, Turkey, 63 junior high school pupils demonstrated that certain middle school kids struggle to answer geometric problems, particularly those involving triangles [23].

Based on the explanation above confirms that self-efficacy and ability solution problem geometry students Still own problematic and necessary researched more deeply. Thus, that's the purpose of the study. This is to explain how middle school pupils feel about their ability to solve geometry problems on their own. Problem-solving stages employed in the research Analysis, exploration, planning, execution, and verification are included here [[27]. Understanding the issue thoroughly is the goal of the analysis. In order to solve mathematical puzzles, exploration is a necessary activity to learn specific concepts. Planning is coming up with a plan to deal with issues. Executing problem-solving solutions is called implementation. and verification, which is the process of double-checking the completed problem-solving.

METHOD

The purpose of this study, which employs a qualitative methodology, is to characterise junior high school pupils' self-efficacy in handling geometry issues. This research was conducted at Junior High School Muhammadiyah 4 Malang City, which has one school year group 2022 -2023. Based on class documents from the school (head schools and eye teachers lesson mathematics) and the results of direct observations by researchers, selected purposively 9th grade as the research sample. Six male students and three female students are a small number of students, even though the school is located in the center of Malang City. Most students are able to follow the lessons, are very responsive, and enthusiastic and involved in teaching and learning activities.

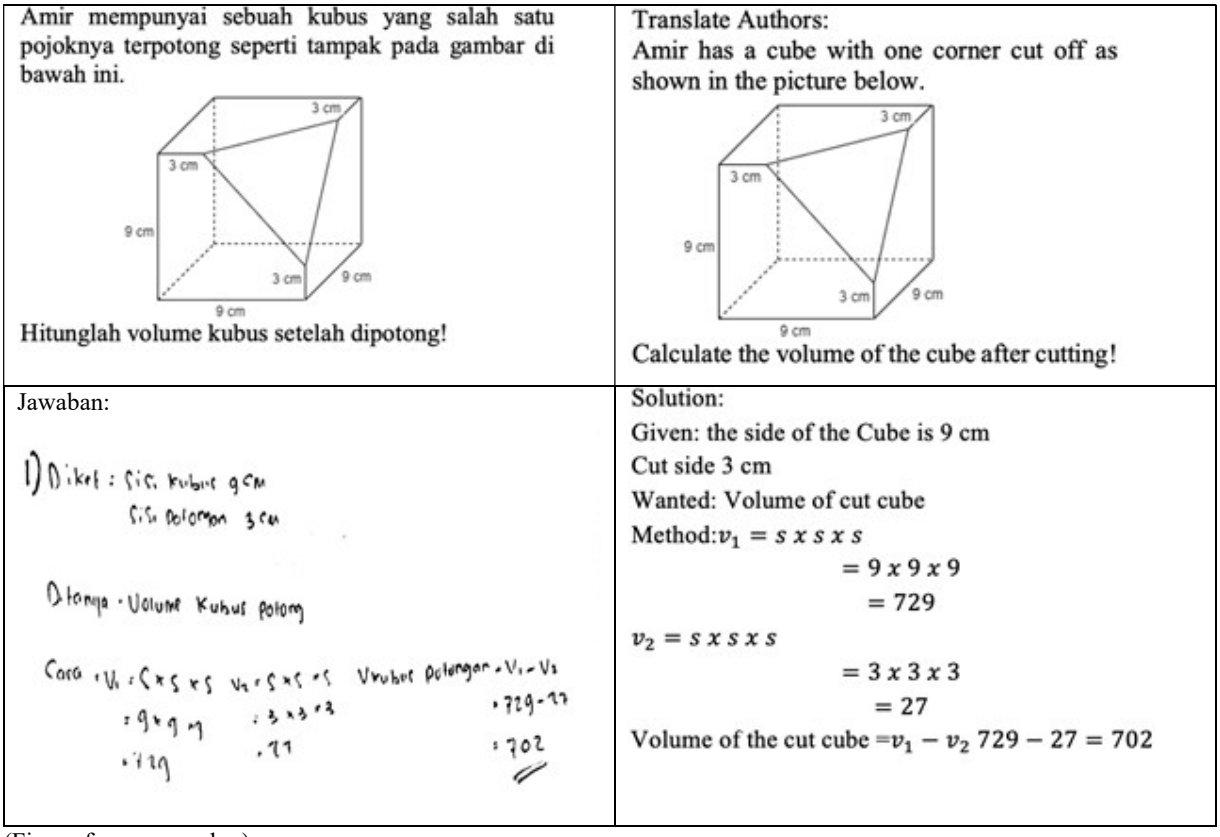
Two instruments were used in this research, namely (i) the Self-Efficacy Questionnaire (SEQ) consisting of 10 statements with a Likert scale 5, and (ii) the Geometry Problem Solving Test (GPST) consisting of 3 questions in the form of descriptions with a maximum score of 10 for each question. Before being given to student grade 9, both instruments were declared valid by two senior lecturers in mathematics education from Surabaya State University and one senior mathematics teacher from one of the State Middle Schools in Surabaya. The three validators concluded that SEQ was valid and appropriate for use using a Likert scale of 5 and 9 for content validation and 9 for feasibility validation items. Similarly, using a Likert scale of 5 and 10 for content validation and feasibility items, they concluded that GPST also met content validity and feasibility. Table 1 below displays the outcomes of the logical validation (content and feasibility

No	Validator	Validation Score		Category	Suggestion
		SEQ	GPST		
1	Validator 1	40.00	43.00	Valid & Eligible	Minor revision
2	Validator 2	40.00	44.00	Valid & Eligible	Minor revision

3	Validator 3	41.00	46.00	Valid & Eligible	Minor revision
Average		40.33	44, 33	Valid & Eligible	Valid if score > 30.50

RESULTS

Two instruments have been given to 9th-grade junior high school students to get SEQ scores and GPST. Based on Table 3, LS gets the score Lowest. Cause LS got a score low indicating that LS hasn't yet been capable of developing a resolution strategy problem and did it several times with error calculations and procedures solution. The following served results LS work in Figure 1.



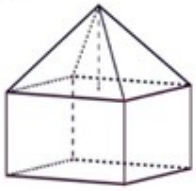
(Figure from researcher)

When interviewed, LS is only capable of mentioning things that are known in the questions and LS provides answers to the questions although answers are not yet clear. LS is not capable of giving logical reasons about relevant relationships for solving problems, and neither does LS inspect the return worked answer. Besides that, when asked about the definition cube, LS hesitantly explained everything that is known about a cube. LS was only capable of analyzing information, that is mention what only what is known and asked in the question. However, when asked the results of exploration about a question, LS felt confused with the problem with the question, and neither on stage exploration, planning, implementation, and verification.

LS's incompetence turns out influenced by low self-efficacy, so the result ability solution lacks LS problem maximum. For questions numbers 2 until 5, LS does not do it, because LS is not capable of identifying things that are asked and what are not capable of identifying connections to solve the problem. If you pay attention to SEQ, LS scores also got low scores from all students. It means the ability solution LS problems are influenced by low self-efficacy. Findings This is similar to several research that says that students with low self-efficacy are not capable of contributing to the solution problem geometry [11], [22], [28].

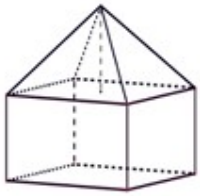
Students with the medium subject (MS) precisely have little ability to stand out compared to LS. MS can identify things that are known and asked in the questions, MS can explain terms used in the question. Besides, MS did 4 questions of 5 questions. Only just a score was obtained not enough pride. For question number 2, MS is capable of answering with good. For question number 1, MS's answer is the same as LS's answer, meanwhile, answers for questions numbers 3 and 4 are also lacking satisfaction. Following served results MS work for question numbers 3 and 4.

3.Perhatikan bangun berikut yang terdiri dari balok dan Piramida



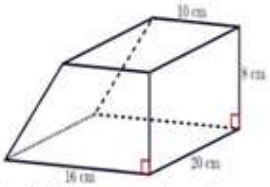
Diketahui balok berukuran
12 *cm x* 12 *cm x* 6 *cm*. Jika tinggi limas 8 cm.
Hitunglah luas bangun tersebut?

Translate Authors:
3. Look at the following figure which consists of a block and a pyramid



Known sized blocks
12 *cm x* 12 *cm x* 6 *cm*. If the height of the pyramid is 8 cm. Calculate the area of the shape?

4. Perhatikan gambar prisma trapesium siku-siku berikut!



Hitunglah luas permukaan bangun tersebut!

Translate Authors:
4. Look at the following picture of a right-angled trapezoidal prism!

Calculate the surface area of the shape!

Solution:

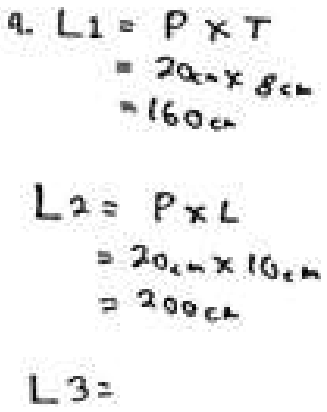


Figure 3. Results of MS Work Number 4

Referring to Figure 2 and Figure 3, MS finds it difficult to develop a resolution strategy problem. When interviewed, MS experienced difficulty in determining the right formula for finishing if there was a problem with the question or not identifying relevant information. Because of obstacles, so results in MS not being able to give facts or proof with correct in solving the problem. Proven by the results of his job, MS isn't capable of finishing questions with good, specifically on question number 4, MS cannot finish questions until finished. Besides, there's no problem with that, MS can't inspect the return answers obtained. Therefore, MS is capable at the stage of analysis and exploration, but not capable at the stage of planning, implementation, and verification. Referring to Table 3, it turns out that MS has sufficient self-efficacy although not get a high score.

Students in the high subject (HS) can stand out compared to LS and MS, but not HS do question number 5 too. HS only does 4 questions that is question numbers 1 until 4. When asked reason, no to question number 5 about cones, HS answered that he was not capable of organizing and identifying problems with the question. Following served results, HS worked on the problem number 4.

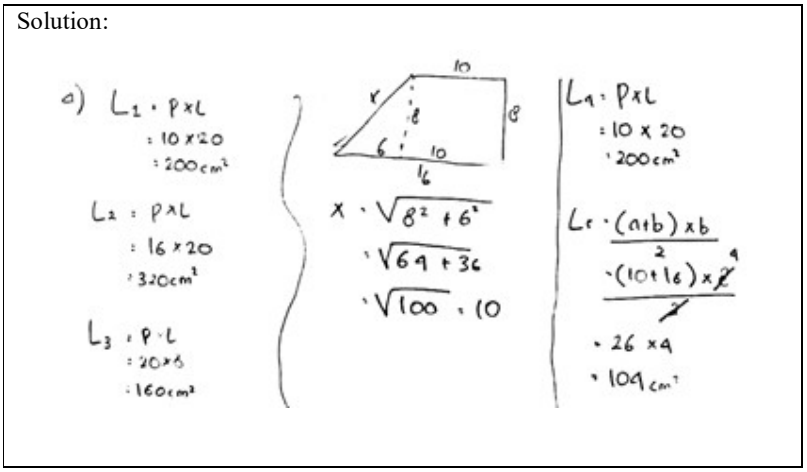


Figure 4. HS Work Results

Based on Figure 4, when interviewed by HS able to mention things that are known and ask questions, HS can do the exploration that is to search draft for a finished problem. When interviewed, HS admitted that He found the appropriate concept for solving the problem with the question. HS is also capable of developing a resolution strategy for problems and proving the settlement process problem, HS wrote complete completion plans and strategies problems as well as can give proof right job in accordance context of the problem asked. HS is also capable of inspecting and returning the answer given. When asked why must be checked to return his work, HS answered that everyone steps and answers more certain of the truth. With so, if LS was previously able to stage analysis and MS capable of stage analysis and exploration, while HS is capable of all indicator stage solution problems.

DISCUSSION

This research was conducted at Muhammadiyah 4 Middle School, Malang City No touch aspects of student gender as in the research [29], [30], [31], [32]. More research, nevertheless, is being done to find out how confident junior high school pupils are in their ability to solve geometry problems on their own. Description results work subject study done after obtaining data on students' MV scores, SEQ scores, and GPST scores.

The SEQ instrument was adapted in May [33] and consists of 10 statements. Initially, SEQ numbered 13 statements, however, based on consideration of suggestions and input from the validator the SEQ becomes 10 statements. The GPST instrument was also adapted from questions from the National Examination for Junior High School in Indonesia which includes the material cube, cuboid, prism, and cone. The GPST originally had eight questions, however it was reduced to five after validator recommendations and input were taken into account.

The phenomenon of weak student self-efficacy in solving problem geometry become attention lately not this one only in students at school primary and secondary, but also in schools tall [22], [34], because student self-efficacy greatly influences the ability solution problem mathematics student [13], [17]. Findings study this give information that students who have high self-efficacy just not yet course can finish problem geometry in a way complete, proven that students with category tall no can solve problem cones, no fewer students in categories medium and low. Identified that students do not enough themselves and are not used to finishing question geometry, so students do not enough understand or are not smart enough to develop and implement resolution strategies for questions given.

Students who have low self-efficacy on average cannot finish problem geometry with good, proven results and less LS work pride. Of the 5 questions given, LS is only capable of finishing question just number 1, which all cannot finish well, meanwhile, Questions numbers 2 to 5 are not done Because no is capable of identifying what problem in question as well and no can compile a plan for the solution. Subject with moderate self-efficacy A little stands out although in several implementations of resolution strategies can't do with good, some workarounds experience errors so that the results obtained are also less maximum. Identified from the results interview that the subject currently experiences significant obstacles. Different from subjects who have high self-efficacy capable of solving problems with good, though he did not do question number 5 about the cone.

Self-efficacy students have a connection with students' mathematical performance thanks to good [11], [22], [35]. As a result, students who have poor self-efficacy cannot improve their mathematical problem-solving [16], [18], [36], [37]. Thus, self-efficacy is a determining factor in student success in solving problem mathematics.

CONCLUSIONS AND SUGGESTIONS

This research has a impact big on the development ability of mathematics junior high school students. Students with the ability solution different problems have different self-efficacy too. SR gets consistent description, identified _ that SR has low self-efficacy in solving problem geometry because LS is not capable do exploring, compiling plan solution problems, applying plans that are drawn up, and not doing verification to results his job. MS is a little stand out from LS and has more self-efficacy than LS, so too in matter solution problem geometry, it is capable at the stage analysis and

exploration problem with the question. HS has excellent self-efficacy, proving that HS can solve all stages solution problems. However, the weakness of all subjects in the study is not finishing question number 5 regarding cones. The reason mainly is students are not capable of compiling a plan solution and delivering proof or facts to solve it problem with the question. Low student self-efficacy in solving problem geometry makes findings interesting for studying more again. Because of that, recommended that the researcher who has focused on the same study for study more carry on material cubes, cuboids, prisms, and cones on other subjects with are appropriate level of education.

ACKNOWLEDGEMENTS

The first author would like to thank the Indonesia Endowment Fund for Education (LPDP) of the Ministry of Finance of the Republic of Indonesia, the Higher Education Funding Centre (BPPT) of the Ministry of Education, Culture, Research and Technology, Rector of Universitas Negeri Surabaya, Head of STKIP YPUP Makassar, and Junior High School Muhammadiyah 4 Malang City for supporting this doctoral research process.

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