(JIML) JOURNAL OF INNOVATIVE MATHEMATICS LEARNING
Volume 7, No. 1, March 2024
P-ISSN 2621-4733
E-ISSN 2621-4741
https://dx.doi.org/10.22460/jiml.v7i1.p18586

THE IMPLEMENTATION OF CONSTRUCTIVE APPROACH TO IMPROVE STUDENTS' PROBLEM SOLVING ABILITY AND SELF CONCEPT ABILITY

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ARTICLE INFO

Article history:

Received Jun 28, 2023
Revised Jul 08, 2023
Accepted Jul 19, 2023

Keywords:

Problem Solving Ability
Self Concept Ability
Constructive Approach

ABSTRACT

The ability to solve mathematical problems is very important because it is one of the abilities that belong to the ability to think at a high level, therefore it must be trained. One of the factors that can support this is self-concept in doing something and especially in learning mathematics, but this is inversely proportional to the field which stated that self-concept and mathematical problem-solving abilities were still relatively low, the panelists were interested in conducting a research entitled the application of a constructivist approach to improve mathematical problem-solving abilities and self-concept of junior high school students, this study used the experimental method using experimental design and schematized by researchers therefore the researcher chose Krida Utama Middle School Jl. Gedong Lima No. V, Kertamulya, Kec. Padalarang, of course, with class divisions, namely an experimental class and a control class of 30 students. To measure mathematical problem-solving abilities and self-concept towards mathematics, the researcher makes a design or learning that is by the approach and makes measurement tools clear and accurate to see the results of constructivism learning, in the final posttest results from the experimental class obtains a Ngain value of 0.5968 in the learning category the experimental class has a pretty good category, and from the results of distributing the Self Concept questionnaire to learning mathematics using the constructivism approach it gets a percentage score of 77.71%, this indicates that learning using the constructivism approach can have a good effect on students' mathematical problem-solving abilities and concepts students towards learning mathematics.

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How to Cite:

Ruchiyat, R.I., Putra, H.D., Hendriana, H. (2024). The Implementation of Constructive Approach to Improve Students' Problem Solving Ability and Self Concept Ability. *JIML*, 7(1), 32-41.

INTRODUCTION

The 5.0 era of society is a century of openness where humans experience fundamental changes that are different from the order of life in the previous century where the main

component is that humans can combine, and create new values through technological and industrial developments. (Sabri 2019). This era has a major impact on various aspects of life, one of which is in the aspect of education. Education is required to produce human resources who have complete competence, who are able to take part in real life, and produce thinker resources who can participate in building economic and technological order. According to Nastiti dan Abdu (2020) Therefore, humans are required to have the ability to respond to changes that occur. One of them, students must be trained to have higher order thinking skills or known as HOTS (High Order Thingking Skills). The ability to think at a higher level can be categorized into various kinds, one of which is the ability to solve problems, in simple terms this problem-solving ability is an important ability possessed by every individual to support their lives in order to compete in the era of 5.0 soceity(Alam 2019).

Problem-solving skills are also integrated into the learning of mathematics spoken Cahyani dan Setyawati (2016) Problem solving is an important part of the mathematics curriculum. In line with that, problem solving ability is one of the basic abilities that students must have in learning mathematics. Problem solving is an attempt to find a way out of a difficulty, achieving a goal that is not immediately achieved (NCTM 2000). In developed countries, problem-solving skills have long been in the spotlight and often a concern in educational circles and some time before became a major topic in applied fields, especially mathematics.

The results of the OECD (Organisation for Economic Co-operation and Development) survey stated that in PISA 2015 Indonesia was ranked 69 out of 79 countries. In 2015, mathematics competence increased from 375 points to 386 points and reading competence increased from 396 to 397 points. This survey sampled 236 schools throughout Indonesia with an age range of students from 15 years to 15 years and 11 months. Students who took the survey were 54.51% from class IX and 45.49% from class X (OECD, 2018). Based on these rankings, the OECD states that the mathematics skills of Indonesian students are relatively low compared to other countries, one of which is in the field of problem solving.

This can also be seen from the results of research from Latifah dan Afriansyah (2021). that students still experience getting a low percentage, namely: at the transformation stage formulating mathematical problems or compiling mathematical models on sub-indicators of difficulty in determining the formula 60% and do not understand the meaning of the question so that they cannot make examples and formulas 73.3%; process skills stage of applying strategies to solve various problems (similar and new problems) inside or outside mathematics on the sub-indicator difficulty in implementing strategies 60%; and the coding stage explains or interprets the results according to the original problem in the sub-indicator of difficulty in making conclusions 53.3%. Overall, the difficulty experienced by students is difficulty in the transformation stage, where students have difficulty in converting problems to mathematical forms / models which results in not being able to complete the problem solving until the end appropriately.

The same is the result of research from (Yuwono, Supanggih, and Ferdiani 2018) (1) at the stage of understanding many students who do not have difficulties because students can already understand the problem, (2) at the planning stage there are some students who do not write down the solution plan but understand in the way they will do to solve the problem but they are not used to writing the plan, (3) at the stage of implementing the plan there are some students who have difficulty because they are not careful so they do not realize the mistakes made. This is because students lack concentration in solving problems, and (4) at the stage of re-examining there are students who have not reached this stage because they have not completed the previous stages not only about the material and methods used in learning mathematics, the attitude possessed by an individual recipient of learning is very influential on learning outcomes in class (Hasan, 2021).

In line according to Subekti dan Andriani (2022) to the ability to learn mathematics. This view can be seen by students in themselves, if students judge themselves that they have sufficient ability to perform tasks then the behavior of students will show that they have the ability. Conversely, if the student judges himself that he does not have enough ability, then in carrying out a task the student will show his inability and it is related to the Self Concept owned by each student. Apart from that, in mathematics there is a sub-material, namely Build a Flat Side Room (BRSD) is a mathematics material taught to Junior High School (SMP) students, Previously, this material was also delivered as an introduction at the elementary school level. Building a flat side room is very important in real life, so the material is very important for students to master, but in general students still have difficulties, for example they feel mistakes in the process of solving them. This agrees with research Hasibuan (Chintia, Amelia, and Fitriani 2021) that students' difficulties in BRSD material students lack understanding in determining the surface area of blocks, cubes, pyramids and prisms as well as the volume of pyramids. From the results of the question trial to students, it was found that 70% of students had difficulty solving problems involving cubes, blocks, prisms and pyramids. Students cannot apply concepts well. Then research conducted by (Maulina 2022) That students have a lot of difficulty in understanding the basic concepts of building space, students still find it difficult to understand the questions so that they have difficulty in determining the formula to be used and do not analyze the commands of the questions well. While in the research conducted (Okta Marika, Haji, and Herawaty 2019) that in geometry learning students are still very difficult in describing space buildings, especially fields in building space plus learning that is still centered on the teacher so that students are less active in participating in classroom learning activities. Referring to the above problems, there are several schemes and methods in learning to become one of the alternatives in the teaching and learning process, one of which is learning using the Constructivism Approach approach. Because this approach can seek and reconstruct learning through empirical events with various situations of "realistic" problems, it can help Shiva to stimulate responses to problems around himself (Retnowati 2010).

In accordance with the results of research from Widana (2021) In conclusion, the learning model of the Constructivist Approach. affect the ability to solve mathematical problems of students with moderate influence or interpretation. In line with the results of research by (Zulfan Hanif Rahman 2019) This proves that students' problem-solving abilities indicate an improvement after applying the constructivist approach in learning. So that the application of the constructivist approach can improve one of the higher-order thinking skills. To help the Constructivist Approach approach combines with the use of media and learning tools that are in accordance with the approach so as to provide student activities that generate positive feedback on mathematics learning itself Hakim (2018) This can be used and combined to become a learning medium in schools that can help the method of approaching the Constructivist Approach.

METHOD

The method used for this study, using experimental design and schematic by researchers, to make this research directed therefore from that the researcher chose the junior high school Krida Utama Jl. Gedong Jl. Gedong Lima No.V, Kertamulya, Padalarang District, West Bandung Regency, West Java of course with class division, namely experimental class as many as 30 students and control class as many as 30 students. As for data collection techniques, namely by using test and non-test instruments, in test instruments researchers create and compile integrated questions with indicators of mathematical problem solving ability including 1) Understanding the Problem, 2) Choosing the right problem solving strategy, 3) Solving problems, 4) Verification and interpretation of results (Assabanny. 2018),

and for non-test instruments using appropriate targets also using the Self Concept indicator itself including: 1) Individual knowledge about himself or the mathematical ability he has.in mathematics lessons 2) Individual expectations about the ideal self-image in the future or ideal mathematical ability possessed, 3) Able to receive mathematics lessons 4) Able to complete math tasks and tests, 5) Able to overcome difficulties in doing math assignments 6) Able to ask questions about math lessons 7) Able to ask opinions about math lessons 8) Have a sense of responsibility in learning mathematics 9) Assessment of how others perceive themselves (Siti Aisyah and Sylviana Zanthy 2019). As for the research framework that is taken can be described below;

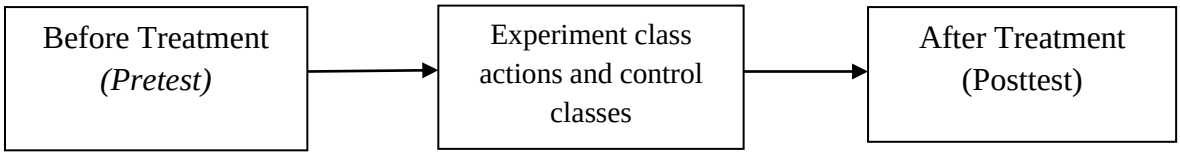

Figure 1. Research Design

In the picture above, this study created a 3-stage scheme, namely the first stage before carrying out the treatment the researcher made a Pretest to be able to find out the cognitive abilities of each student in problem solving abilities, the next stage was the treatment of learning using the constructivism approach then the last stage was using the Posttest with the step that is used is a test of mathematical problem solving abilities and the distribution of student response questionnaires regarding self-concept. As for the data analysis technique used, namely using SPSS software with normality test analysis, homogeneity test and N-gain to see some differences in learning that uses a constructivism approach rather than conventional learning

RESULTS AND DISCUSSION

Results

The first step in this research is that the researcher creates a scheme by conducting a pretest which produces the following data;

Table 1. Pretest Score Average Results

Group Statistics					
	Kelas	N	Mean	Std.Deviation	Std. Error Mean
Pretest	A	30	53,8333	13,17543	2,40549
	B	30	59,5000	10,77593	1,96741

It can be seen in the table above that from some of the results of the pretest values carried out by researchers in class A as the control class and class B as an experiment with no action yet there are several differences from class A getting an average value of 53.8333 while in the experimental class getting an average -the average value is 59.5000, this shows some significant differences. In the next stage, the researcher conducts learning using a constructivist approach with a scheme that has been designed by the researcher, so what is done is to analyze the data to see how the data is normally distributed, so the researcher does analysis using SPSS with the following data;

Table 2. Pretest and Posttest Normality Test Results

Tests of Normality							
	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	A	,147	30	,098	,954	30	,216
	B	,185	30	,010	,936	30	,070
Postest	A	,142	30	,124	,946	30	,133
	B	,134	30	,178	,955	30	,227
a. Lilliefors Significance Correction							

In the table above we can analyze that in the pretest class A as the control class has a significance of 0.98 which indicates that the data is normally distributed while in class B, namely the experimental class has a significance of 0.10 which indicates that the data is not abnormally distributed because it is in accordance with reference owned if the data value is > 0.50 then the data is normally distributed inversely if the data value is <0.50 then the data is not normally distributed, then the researcher takes action with learning that has been designed in such a way, so that researchers can carry out tests ability after carrying out the action and the results of the analysis that from both class A and class B data are normally distributed. After carrying out the normality test, the researcher proceeded to the homogeneity test stage on the results of the posttest data, so that the following data was obtained;

Table 3. Homogeneity Test Results

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Nilai	Based on Mean	7,387	1	58	,009
	Based on Median	5,287	1	58	,025
	Based on Median and with adjusted df	5,287	1	46,551	,026
	Based on trimmed mean	7,292	1	58	,009

We can see carefully that the next step is the homogeneity test if we refer to the basis for decision making, namely when the data has a significance value > 0.05, the distribution of the data is homogeneous, while the reverse is when the significance value is <0.05, the distribution of the data is not homogeneous in such a way that from the data that researchers get in the table above the average significance value has a range above 0.05 so that it can be concluded that the results of the data analysis are homogeneous to be able to see from the effectiveness of learning using constructivism and conventional learning using the N-Gain Test and the data as follows;

Table 4. N-Gain Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_skor	60	,31	,94	,5986	,14532

Ngain_per	60	31,25	94,29	59,8583	14,53201
Valid N (listwise)	60				

It can be seen from the N-gain test table above which interprets the mean data on the N-gain score obtaining a value of 0.5986 which means that it indicates that its effectiveness is in the medium category while the N-gain percent is at 59.8583 which shows that when viewed from the basis of conclusions namely obtaining a fairly effective category,

After carrying out the mathematical problem-solving ability test, the researcher also gave a student response questionnaire regarding Self Concept which had been adjusted to the indicators and as for the collection of the response questionnaire, the researcher conducted data analysis with the following results;

Table 5. Self Concept Student Response Questionnaire Results

No	Indicator	Statement Items	Control Class	Experiment Class
1	Individual knowledge about himself or the mathematical abilities he has. in mathematics lessons	1,2,3	65%	79%
2	Individual expectations regarding the ideal self-image in the future or the ideal mathematical ability possessed	4,5,6,7	70%	64%
3	Able to accept math lessons	8,9	72%	80%
4	Able to complete math assignments and tests	10,11,12	78%	82%
5	Able to overcome difficulties in doing math assignments	13,14,15,16	69%	79%
6	Able to ask questions about mathematics lessons	17,18,	79%	69%
7	Able to submit opinions about mathematics lessons	19,20,21	60%	79%
8	Have a sense of responsibility in learning mathematics	22,23,24,25,26	76%	83%
9	Judgment about how others see him	27,28,29,30	68%	79%
	Average Amount		**70,77%**	**77,11%**

It can be seen from the table above that there are results of processing student response questionnaires to students' Self Concepts in mathematics learning using a constructivism approach and by using a conventional approach from several Self Concept indicators that researchers schematized in distributing questionnaires. It can be seen the significance of the indicator control class that gets the highest score that is, the indicator is capable and able to ask questions about learning mathematics while the indicator that gets the smallest value is the indicator being able to express opinions about learning mathematics, this happens in the control class so that the average score of the Self Concept questionnaire scores 70.77%, which is then in the experimental class that gets action with a constructivism approach to learning

mathematics in class. In this experimental class, the indicator that obtained the highest score was the indicator of having a sense of responsibility towards learning mathematics, while the indicator that received the lowest score was the ideal self-image in the future or the ideal mathematical ability possessed. The data above is the result of the research and actions that the researcher took.

Discussions

It can be seen from the table above that there are results of processing student response questionnaires to students' Self Concepts in mathematics learning using a constructivism approach and by using a conventional approach from several Self Concept indicators that researchers schematized in distributing questionnaires. It can be seen the significance of the indicator control class that gets the highest score that is, the indicator is capable and able to ask questions about learning mathematics while the indicator that gets the smallest value is the indicator being able to express opinions about learning mathematics, this happens in the control class so that the average score of the Self Concept questionnaire scores 70.77%, which is then in the experimental class that gets action with a constructivism approach to learning mathematics in class. In this experimental class, the indicator that obtained the highest score was the indicator of having a sense of responsibility towards learning mathematics, while the indicator that received the lowest score was the ideal self-image in the future or the ideal mathematical ability possessed. The data above is the result of the research and actions that the researcher took However, there are also disadvantages to traditional methods. Students who are taught this method usually become less imaginative and unable to think outside the box. Mathematical problems are only taught to students in a predetermined way; they are not given the opportunity to be solved in a new way. Therefore, in order to make traditional methods more attractive and innovative, educators must find new ways to develop them. Teachers can encourage students to discuss and work together to solve math problems by utilizing more interactive teaching strategies. Students will feel more involved in the learning process and be more motivated to learn mathematics as a result. The first step taken in this research is the pretest in learning to find out the results of the first ability of the control class and the experimental class to get the same test questions according to the indicators of mathematical problem solving ability made by the researcher. As for the things that can be considered in this study, the results obtained are average. -the average is not much different, then the researcher treats and acts on the experimental class with a constructivism approach. At first the researchers made learning designs and tools integrated with constructivism-based learning to suit the desired results and methods, while learning was schematized for several meetings, while the steps or syntax used by researchers in this study referred to the following steps;

Table 6. Constructivism Approach Syntax

Phase	Orientation
First Phase	Orientation: At the orientation stage students are invited to be able to pay attention, develop and provide opportunities to be motivated towards content and material in learning mathematics.
Second Phase	Elicitation; At this stage of elicitation students are invited to freely discuss, describe ideas that are known from seeing the problems presented in

	the mathematical content. Reconstruction of ideas; In this stage, students clarify ideas by contrasting their ideas with the ideas of other people or friends through discussion. Faced with other ideas a person can be stimulated to reconstruct his ideas, if they don't fit. Instead become more confident if the idea fits. Idea Application; In this step, the ideas or knowledge that students have formed need to be applied to various situations they face. This will make students' knowledge more complete and even more detailed. Reviews;
Third Phase	In this step, the ideas or knowledge that students have formed need to be applied to various situations they face. This will make students' knowledge more complete and even more detailed.

In the table above, the steps in learning for students in the experimental class can be adjusted to the conditions and situations in order to make learning interesting so that students can receive learning well so that they can improve the ability of students' mathematical problem solving. Mathematical problem-solving abilities in order to be able to measure and see the results of the effectiveness and improvement of learning using the constructivism method on the results of the posttest can be seen with sufficient significance and it can be seen that if the learning using the constructivism method or approach is in the category quite effective, it can be seen from several times in know the ability test questions, the person doing it does not need to worry about how long it will take to reach a solution to the problem presented because the person doing it has knowledge of the steps in linking the solution with the problem item. Meanwhile, the person who does it has access to abilities that will be used in the long-term selection process to achieve the problem's resolution. The majority of students have difficulty following the steps of rechecking results because they have to demonstrate using different ideas or methods. As a result, students become confused about how to apply various concepts, methods, and steps to perform calculations. Not only that, there are several analyzes regarding the Self Concept. This is important because a person's self-concept is a complete self-image, which includes self-perception, feelings, beliefs, and values. A person's self-concept is his view of himself, how he sees his strengths and weaknesses and how to plan his life's vision and mission. Well organized, it can be seen from the results obtained from the data above that the Self Concept of the control and experimental classes has very different values. far, this can happen because mathematics self-concept is one of the factors that influence learning outcomes. Students' perceptions of themselves as a whole—students themselves—will provide direction to find and determine how to achieve the expected learning outcomes. Assessment of one's self-concept one's capacity to judge oneself. Humans are living beings with a need to grow and eventually make peace with their existence. The following developments support the individual's growth in their sense of self-worth. Self-concept is a

person's perception of themselves, including physical, psychological, social, and emotional goals and their achievements. This also has the same effect on mathematics when a person is good at his self-concept, it will also affect the learning of mathematics. so in simple terms, constructivism learning can affect cognitive development and student learning in line with that expressed by Naufal (2021) that the relationship between constructivism learning and improving the cognitive abilities of mathematics students. Constructivism learning is suitable to be applied to improve students' cognitive abilities, especially in solving problems related to mathematics in real life. In addition, meaningful learning in mathematics can provide different views from students on themselves and their mathematical problem solving abilities, this indicates that one constructivist approach can make learning more effective for students (Sari and Pujiastuti 2020)

CONCLUSION

Based on the results of research and discussion in the research entitled the application of constructivism approach to improve mathematical problem solving ability and self-concept, Krida Utama Padalarang junior high school students get several results, namely from the results of mathematical problem solving ability tests from two different comparative classes obtained constructivism learning results are quite effective in improving this mathematical problem solving ability, In addition, there is a significant difference from the results of the accumulation of student responses from Self Concept, from classes that get action using a constructivist approach and a conventional approach, so for that the constructivist approach can affect the ability to solve mathematical problems and Self Concept students.

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