



A Classroom Action Research (CAR): Students' Creativity Enhancement Through Problem Solving Learning

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Abstract

The purpose of this study is to improve students' creativity through problem solving learning. Students' creativity is an important issue in Mathematics Economics class. Some of the problems that occur are (1) the lack of students in asking questions; (2) low idea of students; (3) lack of courage in expressing opinions; (4) lack of ability to solve difficult mathematical problems in class, and (5)) lack of courage in defending his opinion when discussing. This research is a classroom action research on mathematics economics course in Mathematics Education Department, University of Muhammadiyah Purwokerto in 2018/2019 academic year. The research phase includes (1) planning, (2) implementing actions, (3) observation, and (4) reflection. The results of this study show good results, because of the 55 students, only 3 students who scored less in the category and the second cycle only 1 student who scored less. Therefore, it can be concluded that problem solving learning can enhance students' creativity.

Keywords: classroom action research, problem solving learning, students' creativity

INTRODUCTION

Based on the teaching experience in the first and second meetings of mathematics economics courses, researchers get a variety of problems of students when learning economics mathematics courses. Those drawn as follows: (1) lack of asking questions. It is proved that the given opportunity to ask questions about the presented material, only a few students ask questions even though when they do not understand the material that has been submitted. It is led to the condition when the problem is given, the majority of students experience difficulties; (2) lack of idea. It brought about students' ideas in solving problems; (3) lack of courage both in expressing and responding opinions. It resulted that during the discussion session, the students tend to keep silent; 4) lack of analyzing and solving problems in difficult level consequently, few students participate to work on the given task and the other ones do not

want to work on; 5) Lack of courage in taking risks. Owing on this issue, the students are not able to defend their own opinions because they tend to depend on others' opinions.

According to Yevdokimov (2018), essentially creative understanding is related to the discovery of something new by using something that already exists. Meanwhile, Chung, et al. (2017) stated that creativity is a process that can be formulated as a form of thought where individuals try to find new relationships, get answers, methods, or new ways of dealing with a problem.

Furthermore, Sanjaya & Budimanjaya (2017) stated that the creative personality traits are: a) curiosity that drives individuals to ask more questions, always pay attention to people, objects, and situations and make them more sensitive in observation and want to know or research, b) having the power of a living idea, namely the ability to demonstrate to imagine many things that have never

happened, c) feel challenged by the progress that drives to overcome difficult problems, d) the nature of risk-taking, which makes creative people not afraid to fail or get criticized, e) the nature of appreciating his own developing talents including conveying ideas.

Speaking of the understanding and characteristics of creative people, Sanphiphat (2017) said that creativity is a one's ability to find new relationships, answers to problems that are dating, both originating from oneself and the environment which is indicated by activities: a) having a deep curiosity, b) having the power of an idea, c) original in conveying ideas, d) able to see the problem from various points of view, and e) attitude to take risks.

Regarding these researchers, creativity is a process that can be formulated as a form of thought where students try to find new relationships, get answers, methods, or new ways of dealing with a problem. Meanwhile, the indicators of students' creativity can be concluded as follows: 1) having a deep curiosity, 2) having the power of an idea, 3) original in conveying ideas, 4) appreciating the idea, 5) able to see the problem from various points of view, and 6) attitude to take risks.

According to Spector (2019), a problem is defined as a situation in which some information is known and other information is needed. Richard (2018) stated that problem solving can be thought of as the process of applying existing knowledge to new situations in order to obtain new knowledge. Furthermore, Lila (2018) said that problem solving as a teaching strategy is a technique where problems are used as a means to help students understand or gain insights from the problems being studied.

Meanwhile, according to Townsend (2018), problem solving method is a process of thinking that is based on scientific thinking steps, because it takes clear, logical, and systematic lines of thought. Trimmer (2019) stated that the problem solving is a learning model that focuses on problem solving skills followed by strengthening creativity.

Focusing on the stages in problem solving learning, Williams (2018) stated in the following activities: (1) formulate the problem; (2) making a hypothesis; (3) collecting data; (4) testing the hypothesis; and (5) drawing the conclusions.

Regarding these problems, researchers can conclude that the creation of learning mathematics students is still relatively low. In the end to overcome this situation, in learning through problem solving learning. It is chosen because the most important characteristic of problem solving learning is that students are expected not only to listen, take notes, then memorize the subject matter, but students actively think, communicate, search and process data, and finally conclude the result.

Therefore, according to those backgrounds, the formulation of the problem is to enhance students' creativity through problem solving learning in the Mathematics Economics class, Mathematics Education Programs, University of Muhammadiyah Purwokerto. Meanwhile, the research objective of this study is to enhance the students' creativity in the problem solving learning process.

RESEARCH METHOD

This type of research is Classroom Action Research (CAR). The CAR was planned into two (2) cycles. The stages of each cycle in this research include (1) planning; (2) action; (3) observation and (4) reflection.

The subjects of the research were students of the mathematics study program at the University of Muhammadiyah Purwokerto who took the Economics Mathematics class in the 2018/2019 academic year.

The indicators of students' creativity are as follows: 1) having a deep curiosity, 2) having the power of an idea, 3) original in conveying ideas, 4) appreciating the idea, 5) able to see the problem from various points of view, and 6) attitude to take risks. The stages of this study include (1) Planning, (2) Acting, (3) Observation, and (4) Reflection. The

description of each of these stages is as follows.

Planning

At the planning stage, it is used to prepare learning tools and research instruments that will be used in implementing actions. The instruments of this research are: (1) the lesson plan of the mathematics economics course; (2) learning media of mathematics economics courses; (3) students' worksheets of mathematics economics course; (4) students' creativity observation sheet; (5) students' activates' observation sheet; and (6) students' creativity test.

Action

At the implementation stage of the action, the lecturer carries out the action in accordance with the plan that has been made, they are problem solving learning activity.

Formulate the problems

1. Provide stimulus in the form of giving material.
2. Divide students into small groups of 3-4 students.
3. Provide problems in the form of questions (students' activity worksheet).
4. Give opportunities for students to ask questions and understand questions in students' activity worksheets.

Making the hypothesis

1. Ask students how the alleged answers to the problems raised.
2. Guide in determining the alleged answers.
3. Provide opportunities for discussion.
4. Ask students to record the results of the discussion in determining the alleged answers.

Collecting data

1. Ask students to look for information needed on the content of learning.
2. Ask students to discuss with their groups to determine the data needed to test the alleged answers.
3. Guide students who have difficulty in solving problems.
4. Provide opportunities for students to ask questions if they are still confused about finding the information needed.

Testing the hypothesis

1. Guide each group in testing the alleged answers.
2. Ask one of the groups to present the results of their work.
3. Ask the other groups to respond.
4. Assess the results of work and rectify if there are errors.

Draw the conclusion

1. Ask students to record the results of the discussion in front of the class or the results of discussions that have been presented
2. Explain the results of the discussion.
3. Guide students in concluding the results of the discussion.

Observation

At this stage, observations were made on student activities in problem solving learning. Also at this observation stage is used to see student activities related to indicators of student learning creativity in mathematics education study programs. Observation using observation sheets that have been made at the planning stage. In addition, at the end of learning in each cycle, students are given a test to measure the creativity of students that have been made during planning.

Evaluation

At this stage, the data obtained from observations, questionnaires, and evaluation sheets are then processed using the percentage formula to analyze students' creativity.

Tabel 1. The Assessment Criteria

Indicators	The percentage	Criteria
The observation of students' creativity	0 – 39	Low
	40 – 69	Medium
	70 – 100	High
The students' creativity test	0.0 – 3.9	Very less
	4.0 – 5.4	Less
	5.5 – 6.9	Enough
	7.0 – 8.4	Good
	8.5 – 10	Very good

Reflection

At this stage, the data obtained at the observation stage is then analyzed. The reflection phase is used to see the weaknesses that occur during learning using problem solving. For further improvements are made so

that the implementation of learning in the next cycle runs better.

Data collection methods used in this study were through observation and tests. The tool used to obtain the data uses observation sheets and tests. The observation sheet used is the student activity observation sheet which is used to obtain student activities related to the steps in problem solving learning. While the test is used to get data on learning mathematics creativity, where the test lattice is made based on creativity indicators. In addition to using creativity, data tests are also obtained through observation.

Data obtained at the stage of implementation of actions and observations, henceforth an analysis of the data. The analysis techniques performed are as follows: (1) data obtained from observations were analyzed with qualitative descriptive analysis, and (2) while the test result data were analyzed by quantitative descriptive analysis in each cycle. Research is said to be successful if there is an increase for each cycle, where the criteria for learning creativity are in the high category, and the results of tests of creative thinking ability are minimal in either category.

RESULT AND DISCUSSION

The activities carried out in this series of research can be described as follows.

Planning

The activities of the planning activities are:

1. The researchers with subject lecturers have an agreement that problem solving learning as learning is used to enhance student creativity in mathematics economics courses.
2. Learning tools in the form of the lesson plan and student worksheets.
3. Learning instruments in the form of student active role observation sheets, observation sheets of lecturer activities, and student creativity tests.

Action

The stages carried out in the implementation of the action is to take action learning in accordance with learning that has

been planned at the planning stage, namely learning by using problem solving learning.

Observation

At this stage observations of student activities and observations of lecturer activities using observation sheets that have been prepared by researchers.

Students activities

The results of observations of the students' activities in the learning process can be described as follows.

Tabel 2. Students' Creativity Recap in Problem Solving Learning Cycle 1

Indicators	Total score	The average	Category
Having a deep curiosity	34	1	High
Having the power of an idea	33	0.97	High
Original in conveying ideas	12	0.35	Low
Appreciating the idea	9	0.26	Low
Able to see the problem from various points of view	14	0.41	Medium
Attitude to take risks	5	0.15	Low
The total average		0.53	Medium

Tabel 3. Students' Creativity Recap in Problem Solving Learning Cycle 2

Indicators	Total score	The average	Category
Having a deep curiosity	33	1	High
Having the power of an idea	32	0.97	High
Original in conveying ideas	15	0.45	Medium
Appreciating the idea	18	0.55	Medium
Able to see the problem from various points of view	25	0.76	High
Attitude to take risks	16	0.48	Medium
The total average		0.70	High

Students test of creativity

The results of student tests carried out at the end of the first cycle can be described as follows.

Tabel 4. The Result of Students' Test of Creativity in Cycle 1

The result	Total students	Percentage
$0 \leq N < 40$	0	0
$40 \leq N < 55$	3	6
$55 \leq N < 70$	5	9
$70 \leq N < 85$	35	64
$85 \leq N \leq 100$	12	21

Meanwhile, the results of students' test conducted at the end of the second cycle can be described as follows.

Tabel 5. The Result of Students' Test of Creativity in Cycle 2

The result	Total students	Percentage
$0 \leq N < 40$	0	0
$40 \leq N < 55$	1	2
$55 \leq N < 70$	3	6
$70 \leq N < 85$	34	62
$85 \leq N \leq 100$	17	31

Evaluation

Students' activities

According to the results of students' activities in the learning process in the first cycle obtained an average for the indicators are: 1) indicators respond to questions or problems 45% (medium criteria); 2) indicators make a hypothesis of 97% (high criteria); 3) indicators designing 76% experiment (high criteria); 4) indicators conduct an experiment to obtain 55% information (medium criteria); 5) indicators collect and analyze 88% data (high criteria); and 6) indicators make 92% conclusions (high criteria).

Subsequently, based on the results of students' activities observation in the learning process in the second cycle obtained an average for the indicators are: 1) indicators respond to questions or problems 52% (medium criteria); 2) indicators make a 90% hypothesis (high criteria); 3) indicators designing an experiment 83% (high criteria); 4) indicators conduct an experiment to obtain 76% information (high criteria); 5) indicators collect and analyze 80% data (high criteria); and 6) indicators make 96% conclusions (high criteria).

Students' test of creativity

In every cycle, the students' tests of creativity are held to measure students'

creativity in learning about the concepts in the problem solving learning model. From the results of the evaluation in the first cycle obtained the following results: 6% of students with fewer criteria, 9% with sufficient criteria, 64% with good criteria, and 21% with very good criteria.

At the end of the second cycle, a test was held to measure the creativity of students learning towards the material. From the test results obtained the following results: 2% of students with fewer criteria, 6% with sufficient criteria, 62% with good criteria, and 31% with very good criteria.

Students' creativity in observation perspective

The results of obtaining an average score of students' creativity through the learning process in the problem solving model of each observation indicator are presented in Figure 1 below.

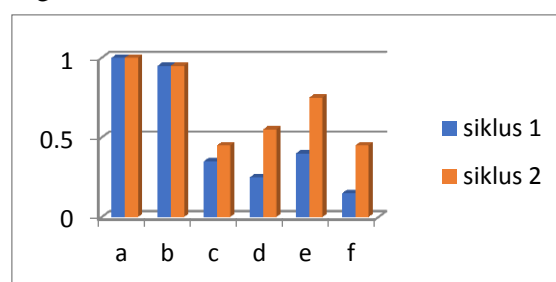


Figure 1. A Diagram of The Implementation of Students' Creativity in Problem Solving Learning

Notes:

- Having a deep curiosity
- Having the power of an idea
- Original in conveying ideas
- Appreciating the idea
- Able to see the problem from various points of view
- Attitude to take risks

Based on observations of students' problem solving creativity during learning from cycle I and cycle II showed that there was a good increase. This is indicated by the average increase from cycle I to cycle II for each indicator as follows: 1) the indicator designing the experiment has increased by 0.10, 2) the indicator is experimenting to obtain information by 0.30, 3) the indicator collecting and analyzing data of 0.35 and 4)

indicators making conclusions have increased by 0.33. This increase occurred because of an increase in student creativity and responsibility in learning and the role of lecturers in guiding and students' creativity.

Students' test of creativity

The results of the evaluation test scores of students' creativity in the learning process in the first cycle are presented in the following figure.

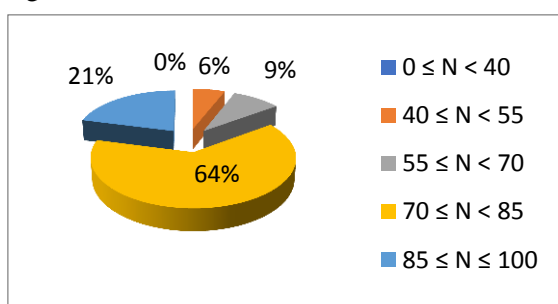


Figure 2. Students' Test of Creativity Scores in Cycle 1 Process

Based on the results of students' tests from the first cycle obtained good results because of only 3 students from 55 students who scored less in the category. The results of the evaluation test scores of students' creativity through the learning process in cycle 2 are presented in figure 3.

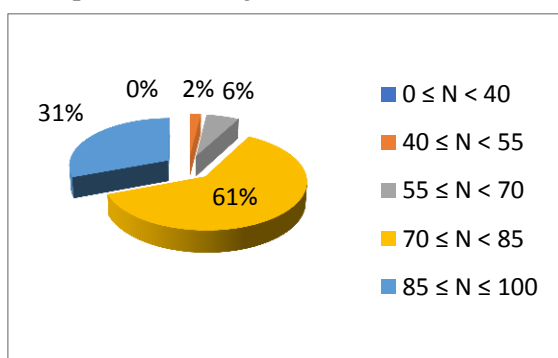


Figure 3. Students' Test of Creativity Scores in Cycle 2 Process

Based on the test results of students from the second cycle, it was also obtained good results because only 1 student out of 55 students received scored less in the categories.

CONCLUSION

After observing and evaluating in two cycles with these results, it can be concluded

that there is an enhance in students' creativity in problem solving learning in the Mathematics Economics class, Mathematics Education Study Program at the University of Muhammadiyah Purwokerto. Meanwhile, Townsend (2018), problem solving method is a process of thinking that is based on scientific thinking steps, because it takes clear, logical, and systematic lines of thought. Trimmer (2019), the problem solving is a learning model that focuses on problem solving skills followed by strengthening the creativity of students.

In addition, the results of the evaluation carried out in each cycle showed good results, because of 55 students, only 3 students who scored less in the category and in cycle II only 1 student who scored less. The findings reported here shed new light on students' enhancement in 5 criteria, namely 1) responding to the questions or problems in high level; 2) making a hypothesis at a high level; 3) collecting and analyzing data in medium level; 4) designing an experiment in low to medium level; and 5) making a conclusion in low to medium level.

REFERENCES

- Chung, J., Hong, M., Kim, S., Yang, J., & Yoon, T. (2017). Redesigning creativity in a university students: A case study with pre-service school teachers in Korea. *Journal Basic of Education*, *11*(3), 415–424.
<https://doi.org/10.11591/edulearn.v11i4.6828>
- Lila, M. (2018). How problem solving learning process can fix the students' creativity problems. *Journal of Applied Quantitative Methods*, *4*(42), 112–122.
- Richard, H. (2018). Managing problem solving learning for developing students' creativity in classroom. *Journal of Education for Teaching*, *3*(14), 113–121.
- Sanphiphat, T. (2017). The key success in creativity: Education need some solutions. *Journal of Curriculum Studies*, *33*(1), 41–42.

- Sanjaya, W. & Budimanjaya, A. (2017). *Paradigma baru mengajar*. Jakarta: Kencana.
- Spector, J. M. (2019). Students' creativity recognition regarding problem solving learning process. *Journal for Research in Mathematics Education*, 3(June), 321–332.
- Townsend, T. (2018). Problem solving method: Finalizing students' creativity problems. *Journal of Architectural Education*, 62(4), 3–140. <https://doi.org/10.1080/10464883.2009.1878735>
- Trimmer, K. (2019). Problem solving learning process to empowering students' creativity. *Journal of Curriculum and Instruction*, 3(34), 442–450.
- Williams, E. (2018). The problem solving learning: The stages for developing students' creativity. In *Journal of Experimental Psychology: General* (Vol. 136).
- Yevdokimov, O. (2018). Problem solving activities in a constructivist framework: Exploring how students approach difficult problems. *Journal for Research in Mathematics Education*, 3(19), 629–636.