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Improving Collaboration Abilities and Students' Learning Outcomes Through Presentation Based Cooperative

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Abstract

Students need to be optimally facilitated in expressing ideas and ideas in their minds through collaborative activities in the learning process. The purpose of this study was to explore the improvement of collaboration skills and student learning outcomes through presentation-based cooperative learning in the mathematics learning strategy subject. The research approach is qualitative and a type of classroom action research. The subjects in the study were 37 students who took the mathematics learning strategy course. Data collection was carried out through observation, tests, and field notes. The results showed that the collaborative abilities of students from the first cycle to the second cycle increased. The ability to interact effectively with fellow students, the ability to guide and lead peers, work effectively in groups, and the ability to manage tasks systematically increased, but the ability to be responsible did not show any improvement. The completeness of student learning outcomes at a predetermined minimum completeness score of 75 has increased, 76% of students complete in the first cycle and 84% of students complete in the second cycle.

Keywords: cooperative learning; collaborative skills; learning outcomes.

INTRODUCTION

Collaborative abilities really need to be possessed by prospective mathematics teacher students in solving problems in professional development and in life in society. Collaboration is a learning process by planning and working together, interacting with others, and participating in discussions that pay attention to differences of opinion to gain knowledge (Grenstein 2012; Woolfolk, 2007). This shows that in a collaborative classroom, students will work and learn together and be involved in meaningful tasks to generate ideas. Student collaborative abilities can be developed in the learning process in higher education through the application of a learning model that is oriented towards student activity.

The cooperative learning model is a learning model that facilitates students to take an active role and collaborate with fellow students in the learning process. Cooperative learning is facilitating students to learn and work in small heterogeneous groups collaboratively, cooperative learning is not the same as group learning (Slavin, 2008; Lie, 2010). The active role of students in cooperative learning can be realized in the form of responsibility for making presentations to convey ideas and ideas.

Mathematics learning strategy is one of the subjects that must be taken by students of mathematics education study program. In this course, students are

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expected to be able to master the concepts and principles of mathematics learning strategies and be able to apply them in mathematics learning in schools. Through cooperative activities in diverse groups and presentations, conveying ideas in their minds to others can provide opportunities for students to build and develop their understanding of concepts. Initial abilities and material topics have an important role in forming diverse groups in cooperative learning (Pons, Prieto, Lomeli, Bermejo, & Bulut, 2014).

Learning outcomes are one of the parameters for measuring student success in taking a course. Mastery of prospective mathematics teacher students of mathematics learning strategies properly is an asset to innovate in the implementation of learning in schools, which focuses on solving problems, improving student reasoning, and using the basics of mathematics needed in everyday life. The five standards of basic mathematical abilities that students must possess include: problem solving, reasoning and evidence, communication, connection, and representation (NCTM, 2000).

Several studies on collaborative abilities have been conducted. Katz & Stuple (2015) found the potential for student involvement in creative mathematical work that demands meta-awareness, self-regulation, and self-efficacy. The belief to work mathematically is communicated by students, many students show a change in attitude towards mathematics and are more involved in unknown or challenging math tasks. Yuan, Xiao, and Liu (2019) reveal that problem solving is one of the important skills of the 21st century, collaborative problem solving has led to extensive innovation in assessment. The reality in the field shows that learning still does not pay attention to student activities that are mediated through presentations in developing collaborative abilities. This research is important and different from previous research that has been described above and has the opportunity for further development. The objective of this research is to explore the improvement of collaborative skills and student learning outcomes through presentation-based cooperative learning in the mathematics learning strategy subject.

RESEARCH METHOD

This study uses a qualitative approach and classroom action research. The subjects in this study were a class of students who took the mathematics learning strategy course, totaling 37 students, namely the 3rd semester of the Mathematics class. This research was conducted collaboratively between a lecturer in the mathematics learning strategy subject and another lecturer in a mathematics education study program.

Data collection methods were carried out through observation, tests, and field notes. Observations were made by two people to observe presentation-based cooperative learning activities using observation guidelines that have been developed based on indicators of student collaborative abilities and learning implementation. Indicators of collaborative ability used in this study were developed from Greenstein (2012) and Trilling & Fadel (2009), including: 1) interacting with fellow students, 2) working in diverse student groups, 3) managing assignments systematically, 4) guiding and leading other people, and 5) responsible. Field notes are used to record unique events that occur during learning. The test is

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used to measure student learning outcomes against the mathematics learning strategy course. The test used in this study was in the form of descriptive questions consisting of five questions.

This research was conducted in two cycles, each cycle includes four stages of activity, namely: 1) planning, 2) implementation, 3) observation, and 4) reflection. The data that has been collected from the results of this study were analyzed using qualitative techniques. The stages in data analysis include: data reduction, data presentation, drawing conclusions from unique and interesting research findings. Data analysis in this study is equipped with scoring on each indicator of collaborative ability and student learning outcomes obtained from tests at the end of each cycle.

RESULTS AND DISCUSSION

The first stage in the first cycle is planning, namely the preparation of learning tools and research instruments. The results of the lesson plans (RPP) that have been compiled in this study use a presentation-based cooperative learning model. The worksheet that students must complete in groups of four or five people and then present them in class discussions, as well as test questions in essay. The topic of the material presented in this lesson plan is about the basic concepts of mathematics learning strategies and their application with a time allocation of two meetings and each meeting 2 x 50 minutes so that the overall time allocation is 4 x 50 minutes.

In the action stage, presentation-based cooperative learning is carried out on the basic concepts of mathematics learning strategies and their application in two meetings. The implementation of this learning is in accordance with the cooperative learning steps which are based on the presentation of the results of the worksheet that have been completed in groups. In the preliminary activity, the lecturer conveys the learning objectives and conditions and motivates students. Then, in the main activity, students sit in groups according to the provisions of the groups that have been formed, namely four or five students with various abilities to work collaboratively to complete the worksheet that has been prepared by the teaching lecturer. In this worksheet, students discuss in groups the types of learning mathematics theories and their applications. Students are given the opportunity to find references related to the types of mathematics learning theories and their application via the internet from their respective smartphones. Then, students were asked to write down the results of their group discussions in writing by making power points. The following is a snippet of the results of group I student discussions that have been outlined in the power point video that looks like in Figure 1.

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Figure 1. Results of Group I Discussion in Cycle I

Furthermore, the group representatives appointed by the lecturer, namely group three, presented the results of the discussion by presenting the writing results in power points that had been prepared in the previous step. Students in other groups are given the opportunity to provide questions, comments or suggestions for improvement. Snippets of student discussion conversations can be presented as follows.

AM: Learning techniques as a way to implement a specific and unique method. Please explain the meaning of this technique or give an example to better understand?

TP: Here I want to ask the speaker, which learning strategies are suitable for SMA class X students using what strategies and why?

AL: According to your group, which component is the foremost and most decisive in creating an effective learning strategy? Please explain, thank you.

MD: We invite the speakers to answer questions from the audion

PM1: OK, here I will answer the question, Ms. TP. In my opinion, the strategy that is suitable for learning in class X high school children is to use indirect learning strategies (inquiry).

PM2: Yes, the reason is because this strategy can encourage creativity and development of interpersonal skills and other abilities, can also express understanding, and encourage interest and desire of students.

MD: How can you understand your TP?

TP: Ok, miss, thanks for the answer

MD: Good, we invite the speakers to answer the next question

PM3: Here we will answer questions from Ms. AM. What is meant by implementing a specific method is the way someone does it according to the student's condition. So specific steps are used so that students can understand the material presented by the teacher. In order to better understand, of course the teacher must also provide unique techniques so that students can easily understand them.

In the closing activity, a reflection is carried out in which the lecturer and the students make conclusions and provide reinforcement and rewards to all students. Furthermore, a final written test is carried out for all students which is done individually. The completeness of learning outcomes with the minimum

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completeness criteria of 75 based on the final test in cycle I can be described as shown in Table 1.

Table 1. Completeness of Learning Outcomes Based on the Final Test in Cycle I

Criteria for Learning Outcomes	Number of Students	Graduating students
Score ≥ 75	28	76%
Score < 75	9	24%

Source: primary data, 2020

Based on Table 1 shows that student learning outcomes through presentation-based cooperative learning in the first cycle in this study 76% of students complete, that is, get a score above 75. The results of this study support the findings of Karali and Aydemir (2018) who found that cooperative learning type STAD which is supported by the Play Tournament Team is effective in improving student academic achievement in mathematics material. In addition, it also supports the findings which state that cooperative learning improves student achievement in mathematics and attitudes towards mathematics (Zakaria, Chin & Daud, 2010).

The observation stage, when the presentation-based cooperative learning takes place, is observed by two mathematics education lecturers regarding the implementation of the learning. The results of the observations of the two observers indicated that the implementation of presentation-based cooperative learning was carried out well. In addition, during the learning process, there were also observations of student collaborative activities. Observation of student collaborative activities in the study was focused on four groups, each observer observing two groups. The results of the observation of the collaborative ability of students in group I and group IV were generally still in the sufficient criteria, while groups II and II were generally in good criteria. The findings of this study are in accordance with the research findings which state that the assessment of student activeness during cooperative problems solving learning can be carried out in detail and carefully (Yuan, Xiao and Liu, 2019). In detail, the scores of the observations on the collaborative abilities of the two observers can be presented in Table 2 below.

Table 2. Observation Results on Student Collaborative Ability in Cycle I

Collaborative Ability Components	Group Score			
	I	**II**	**III**	**IV**
Interact effectively with fellow students	60	70	75	60
Work effectively in diverse student groups	60	67	73	60
Manage tasks systematically	65	70	75	65
Manage tasks systematically Guide and lead other	60	67	70	65
To be responsible	75	75	80	75
Total	320	349	375	325

Source: primary data, 2020

The reflection stage, evaluating and reflecting on the results of observations of the implementation of learning in cycle I, student collaborative abilities, and the results of the final test. The results of reflection show that the learning has been carried out well, but the collaborative ability of students in group I is still in sufficient criteria. Students need to be motivated to interact more effectively, work better in groups, and be more enthusiastic in guiding and leading friends. The

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percentage of students who complete or get a score above 75 is good, namely 76%. Therefore, it is necessary to take further action in cycle II.

The first stage in the second cycle is planning based on the results of the first cycle of reflection, namely RPP with a presentation-based cooperative model that prioritizes more effective student interaction. The topic of the material presented in this learning tool is material on innovative learning models. The worksheet related to the learning model material that students must complete and present, as well as test questions. The time allocation in this RPP is two meetings and each meeting is 2 x 50 minutes.

At the action stage, presentation-based cooperative learning is carried out on material on innovative learning models in two meetings. The implementation of this learning is in accordance with the steps of cooperative learning which is based on the presentation of the results of the worksheet results with the lecturers to further motivate the emergence of interaction between students in understanding the material. During the discussion in small groups, each student before expressing questions or ideas to other friends is asked to find references about learning models via the internet and understand them. Then, students are asked to write down the results of their group discussions in writing by making power points according to the given worksheet. The following is a snippet of the results of the group IV student discussion which has been outlined in the power point video that looks like in Figure 2 below.

Figure 2. Results of Group IV Discussion in Cycle II

Furthermore, the group representatives appointed by the lecturer, namely group four, presented the results of the discussion by presenting the writing results in power points that had been prepared in the previous step. Students in other groups are given the opportunity to provide questions, comments or suggestions for improvement. Snippets of student discussion conversations can be presented as follows.

RR: In addition to discovery learning, there is training students to work together between students and there is also learning to solve problems by themselves, I ask how does discovery learning train cooperation between students, whereas discovery learning is essentially solving problems by themselves?

AW: In the characteristics described in the second point, namely learning activities based on student interests. My question is what about a student,

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who has a low interest in learning? MD: Alright, please for the presenter to answer questions from Ms. RR

PM2: In discovery learning students are only faced with something that raises questions, and the teacher does not provide ideas or conclusions so that it raises the desire for students to investigate for themselves.

PM1: Whereas in experimental learning, the teacher needs an explanation of what will be passed in the experiment, for example explaining the tools for the material objectives to be carried out in the experiment

MD: Alright, how did you understand, Miss RR?

RR: Yes, moderator, thank you

MD: Please, the speaker will answer the next question

PM3: In discovering learning, problem solving can be done in groups so it can train student cooperation

In the closing activity, lecturers and students make conclusions and provide reinforcement and rewards to all students as in the first cycle. Furthermore, the final test is carried out on all students. The completeness of learning outcomes with the minimum completeness criteria of 75 based on the final test in cycle II can be described as shown in Table 3 below.

Table 3. Completeness of Learning Outcomes Based on the Final Test in Cycle II

Criteria for Learning Outcomes	**Number of Students**	**Graduating students**
Score ≥ 75	31	84%
Score < 75	6	16%

Source: primary data, 2020

The observation stage, as in the first cycle, when the presentation-based cooperative learning takes place, two lecturers are observed. The results of the observation showed that the implementation of presentation-based cooperative learning was carried out well and the collaborative abilities of students in groups I, II, III and IV were in good criteria. The findings of this study are in accordance with the results of research which found that through cooperative learning can assess student involvement in solving mathematical problems creatively by involving metacognition (Katz & Stupel, 2015).

In detail, the scores of the observations on the collaborative abilities of the two observers can be presented in Table 4 below.

Table 4. Observation Results on Student Collaborative Ability in Cycle II

Collaborative Ability Components	**Group Score**			
	I	**II**	**III**	**IV**
Interact effectively with fellow students	75	75	80	80
Work effectively in diverse student groups	75	75	75	75
Manage tasks systematically	75	75	77	75
Manage tasks systematically Guide and lead other	77	78	75	75
To be responsible	75	75	80	75
Total	377	378	387	380

Source: primary data, 2020

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The reflection stage, evaluating and reflecting on the results of observations of the implementation of learning in the second cycle and student collaborative abilities, as well as the final test results. The results of reflection show that learning has been carried out well, students' collaborative abilities have increased from the first cycle, which is in good criteria. The results of this study support the research findings which state that 60% of students' collaborative abilities can work productively, 85% have a respectful attitude, 65% can compromise, and 65% are responsible (Anantyarta & Sari, 2017) and show a positive influence on students in the process. study and work (Onrubia, Rochera, & Engel, 2015). The percentage of students who completed or scored above 75 also increased from the first cycle, from 76% to 84%. The results of this study support the research findings which state that through cooperative learning the ability to understand mathematics and students' self-confidence increases (Zakaria, Solfitri, Daud & Abidin, 2013). Cooperative learning has a positive effect on mathematics learning achievement in higher education (Turgut & Turgut, 2018).

CONCLUSION

Student collaborative abilities can be improved through presentation-based cooperative learning. Students present their work and discussion in small groups in the form of power points. Interaction between students can run effectively and students can express their ideas about the concept of learning strategies well. Student learning outcomes for the learning strategy course increased from cycle one to cycle two, namely from 76% to 84% of students who had completed.

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