Application Of Jigsaw Method With Metacognitive Approach In Social Statistics Learning To See Students' Problem-Solving Abilities

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Abstract: This study aims to describe the application of the jigsaw method with a metacognitive approach to social statistics learning and to see the ability of problem-solving and student responses to learning social statistics. Data collection methods in this study used three instruments namely observation, tests and questionnaires. This research is a descriptive study with a qualitative approach. The results of the study of the application of the jigsaw method with this metacognitive approach showed a very good category from the overall average with the breakdown of student activities getting 85.06, student responses getting 88.27 and the level of problem-solving skills obtained 91.02.

Index Terms: Jigsaw Method, Metacognitive Approach, problem-solving ability.

1. INTRODUCTION
Mathematical learning can be carried out well if educators master the mathematical concepts to be taught [1][2]. Educators in learning function as learning designers, instructors, and evaluators. Completeness in good learning will improve the quality of learning [3]. The learning process aims to develop student activities through various interactions and learning experiences. Student activities in class are seen in student activity. Student activeness in teaching can be seen when students can solve problems given by educators. However, in teaching, not all educators can master the class, especially if the material being taught is mathematics. Henry Brown [4] states that in teaching mathematics many strategies can be used by educators, such as (1) help students develop mathematical skills with good problem solving; (2) encourage students to use metacognitive strategies and (3) make mathematics interesting to students. Solving mathematical problems is the main subject intended to improve one’s ability in the field of mathematics [5]. For students to solve mathematical problems, effective methods and approaches must be used. The results of observations that were carried out on March 20, 2019, show that learning activities in the classroom are still passive and students are more dependent on educators in studying the material provided by educators even though educators have given worksheets or activity sheets. The results of observations showed that in the learning activities of students’ responses were less active it could be seen that 10 out of 52 students who responded to the motivation of the educators. Students involved are only students who have above average abilities. While the other students just kept quiet. Students experience difficulties in the process of solving mathematical problems. The ability to solve problems is very important for every mathematical problem [6]. The ability to solve student problems is still not well seen when students work on problems given by educators and on math books that have been done. Problem-solving [7] means a series of mental operations performed by a person to achieve a certain goal. The task of educators, in this case, is to guide and direct students so that the level of problem-solving is better and correct by referring to the problem-solving process of experts. The problem-solving process will be helped when students discuss. Discussions are more effective in learning activities when compared to the lecture method [8][9]. Based on the results of observations that have been carried out it can be concluded that the method and approach are important components in learning in the classroom because the method will affect student responses, it appears that students can not focus on learning mathematics.
A positive response to learning looks good if students can interact and cause a backlash with educators and the material being taught especially mathematics. Good mathematics learning is to improve the correct problem-solving process by referring to experts because the ability of the problem-solving process is the main focus in mathematics learning [7]. Learning process activities that need to be improved are ways in the process of teaching and learning in mathematics [10]. The discussion method is good if educators can apply it with creative discussion methods. Educators should be able to involve students in both high, medium and low abilities so that classes come alive with creative and innovative methods. Things that are not optimal must be sought for a solution so that learning in the classroom can run well. The solution is to use appropriate learning methods and approaches. The learning method that can be applied is the Jigsaw method, while the approach that can be used is by using a metacognitive approach. The jigsaw method is used so that students can interact with peers to discuss the material provided well because it is group learning [11]. This method emphasizes the responsibilities of students and is heterogeneous so that there will be no students who are negligent of responsibility or lazing in groups. The jigsaw method can help foster a positive response to mathematics learning because in addition to discussing students will get useful knowledge from other groups with the problem-solving process.
Problem-solving in this study uses the Polya problem-solving process. There are 4 steps in problem-solving [12], namely understanding the problem (understanding the problem), compiling a plan (dividing a plan), carrying out a plan (carrying out the plant) and checking back (looking back). Polya’s problem-solving steps are used to determine the level of
problem-solving ability of students. The response is seen from several aspects, namely interest, understanding, and implementation. Interest is focused on statements about whether or not they like the learning process. Understanding is focused on the statement of students' understanding of the material being taught. Jigsaw method is a method that has the aim of providing and discussing new information or knowledge, tasks are shared with all members and each member has their respective responsibilities, individual discoveries or successes determine the success of the group [7]. All groups in learning this method will be responsible for discussing the material and solving the problem. The steps of jigsaw learning are (1) Formation of Heterogeneous Groups (2) Giving Tasks and Learning Objectives (3) Division of Sub Material (4) Formation of Expert Groups (5) Returning to Original Groups and (6) Self Evaluation [7]. The approach is a starting point or point of view of educators about the occurrence of a learning process that includes two dimensions, namely student-centered or teacher-centered [13].

One type of approach is the metacognitive approach. Metacognitive said as awareness in knowledge, ideas and own thoughts [14]. Metacognitive is an awareness of students thinking about how their thinking process which includes two components, namely metacognitive knowledge, and metacognitive skills so students must be aware of awareness about what is known and what will be done in learning [15][16]. Based on that it was concluded that a metacognitive approach is a student-centered approach to grow and develop cognitive aspects of learning that include awareness, cognitive strategies, planning and reexamining [17]. The steps of learning in the classroom using a metacognitive approach have six steps in learning according to [18] are (1) Identifying the problem (2) Telling about thinking (3) Making a note of thought (4) Planning and doing self-regulation ( 5) Controlling the thought process and (6) Self-evaluation. Based on the above matters, the purpose of this study is to describe the application of mathematics learning using the jigsaw method with a metacognitive approach and student responses to mathematics learning using the jigsaw method with a metacognitive approach and (3) the level of problem solving abilities of students in learning mathematics using the jigsaw method with metacognitive approach.

2 METHOD
This study aims to describe the application of the jigsaw method with a metacognitive approach to social statistics learning and to see the ability of problem-solving and student responses to learning social statistics. This research is a descriptive study and the approach of this study is qualitative. Descriptive research is research that describes an event that becomes the center of attention without giving special treatment to the event to systematically explain something using factual and accurate observation techniques about the facts and characteristics of certain activities [19]. A qualitative approach is a study in which, interviews, content analysis and other collection methods to present the subjects’ responses and behavior [20]. Data collection methods here use three instruments namely observation, tests and questionnaires. Observation is used to observe the activities in class to know how the application of methods and approaches that have been designed which include the activities of educators and students who have determined the limits and categories to be assessed. The test was conducted to determine the level of

3 RESULT AND DISCUSSION
3.1 Application of the Jigsaw Method with a Metacognitive Approach
The first result and discussion are how to apply the jigsaw method with a metacognitive approach in learning Social Statistics. The application of the jigsaw method with a metacognitive approach can be seen from two aspects, namely the activities of educators and students. The following are the observations during the research in the four meeting results:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Average % overall at meetings 1,2 and 3</th>
<th>Average % of student activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking</td>
<td>75,90</td>
<td>82,54</td>
</tr>
<tr>
<td>Writing</td>
<td>74,91</td>
<td>85,59</td>
</tr>
<tr>
<td>Listening</td>
<td>72,92</td>
<td>79,83</td>
</tr>
<tr>
<td>Mentally</td>
<td>73,60</td>
<td>88,97</td>
</tr>
<tr>
<td>Overall average</td>
<td></td>
<td>82,175</td>
</tr>
</tbody>
</table>

Student activity at the first meeting is speaking consisting of 2 indicators and obtaining a percentage of 75,90 that range is included in both categories. Speaking at the second meeting obtained a percentage of 82,54 which has a very good category. Speaking at learning activities include student activities in asking questions to friends in study groups and student activities in issuing opinions in group discussions. At the third meeting speaking in the evaluation of 2 students increased to 86,85. The overall average in the speaking aspect is 81,76 and being in a good category means that students in the speaking aspect have increased from 1 to 3 meetings even though the increase in students is not much but there is still a very good category. The second aspect is taking notes. Student activities are writing detailed answers to study groups and students taking notes from friends in group discussions. In this activity, students can tell or discuss the results discussed. Noting at the first meeting obtained a score of 74,91 this category entered in the good category. At the second meeting, it was 85,59. The category of recording students in this activity is very good. At the third meeting recorded a score of 89,89 this category is very good because most students record what is important in learning and the majority of students take notes in their notebooks, it means that the metacognitive aspects of students are very good and grow well and following the plan educators give. On average all aspects are 83,46 so that the categories are very good. The third student activity is listening, where there are two indicators in it. In the first indicator, students listen to the explanation of the educator in the process of solving problems in Student activity and students listen to explanations from friends in the process of solving problems in Student activity. Students pay attention to the steps and efforts of educators in growing.
metacognitive aspects of students to minimize noise with useful activities. The percentage of listening at the first meeting was 72.92 and at the second meeting was 79.83. The third meeting obtained a percentage of 85.24 higher than the first and second meetings. This third aspect of getting a very good category means that students in listening to the explanation of educators and friends are very good in the problem-solving process. The overall average for all aspects of listening was 79.33 or in the good category. The fourth aspect of student activity is mental. In the fourth aspect, 2 indicators become the achievement of all these aspects. Both indicators include students analyzing problem-solving provided by educators in the form of worksheets and students trying to solve problems with a metacognitive approach. Mental at the first meeting was 73.60 and got a good category, at the second meeting was 88.97. The third meeting gained 89.84 and was in the excellent category. The percentage of mental aspects as a whole gained an average of 84.15 and was in a good category. Based on the description for each aspect of student activity, it can be seen that the overall percentage is 82,175 or in good categories. So it can be concluded that student activities in learning using the jigsaw method with a metacognitive approach is very good because there is a significant increase. This is also in line with research conducted by [21], in which the study explained that the Jigsaw method is very effective in learning.

3.2 Student Responses to the Jigsaw Method with a Metacognitive Approach

The questionnaire was distributed at the last meeting, which was at the fourth meeting. Response measurement is measured through 3 aspects, namely interest, understanding, and implementation of learning using the jigsaw method. Following are the results of student responses.

<table>
<thead>
<tr>
<th>No</th>
<th>Response aspect</th>
<th>Number of Questions</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interest in using the jigsaw method with a metacognitive approach</td>
<td>5</td>
<td>86.30</td>
</tr>
<tr>
<td>2</td>
<td>Understanding the material by applying the jigsaw method with a metacognitive approach</td>
<td>5</td>
<td>88.16</td>
</tr>
<tr>
<td>3</td>
<td>Implementation of jigsaw learning methods with metacognitive approaches</td>
<td>4</td>
<td>85.55</td>
</tr>
<tr>
<td></td>
<td>Overall average</td>
<td></td>
<td>86.67</td>
</tr>
</tbody>
</table>

Of all the responses on the three indicators namely interest, understanding and implementation are all in the high category. The aspect of interest obtained an average of 86.30 which was categorized as very good. The aspect of understanding gained an average of 88.16 with a very good category and the aspect of implementation achieved an average of 85.55 and a very good category. Of the three aspects, the aspects of understanding are superior to interests and services, however, interest and implementation are in the category of very good.

3.3 Level of Problem Solving Ability Using the Jigsaw Method with a Metacognitive Approach

The problem-solving ability of students in Social Statistics courses can be known through the results of individual tests conducted twice at meetings two and four. The ability to solve problems include (1) understanding the problem with 2 indicators namely (2) preparing a plan with indicators students can translate problems into mathematical language and students can choose concepts to solve problems (3) implement plans with indicators and (4) test answers with indicators that students can adjust the results to the problem being asked and students can test the accuracy of calculations.

The results are as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Problem-solving criteria</th>
<th>Evaluation I</th>
<th>Evaluation II</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understand the problem</td>
<td>80.05</td>
<td>81.8</td>
<td>80.92</td>
</tr>
<tr>
<td>2</td>
<td>Make a Plan</td>
<td>77.24</td>
<td>78.1</td>
<td>77.17</td>
</tr>
<tr>
<td>3</td>
<td>Carry out the plan</td>
<td>77.5</td>
<td>79.07</td>
<td>78.28</td>
</tr>
<tr>
<td>4</td>
<td>Re-examine</td>
<td>75.67</td>
<td>79.75</td>
<td>77.71</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td></td>
<td></td>
<td>79.16</td>
</tr>
</tbody>
</table>

The aspect of understanding in evaluation 1 is the good category which obtains an average of 80.05. Understanding in evaluation 2 obtained an average of 81.8. Students at this stage can identify the adequacy of the data needed and state the problem in their language, students can identify the data needed and students can state the problem according to the problem. The second problem-solving ability is to plan. In evaluation one, the average obtained was 77.24 and the evaluation of two was 78.1. On the ability to draw up plans students have not been able to translate problems into mathematical language and can choose concepts to solve problems or confused students will use what steps to solve these problems. The third problem-solving ability is to carry out the plan. The average acquisition in evaluation 1 was 77.5 and evaluation 2 was 79.07 both in the good category. At this stage, many students do not know what steps should be taken, other than that students still do not understand and are confused in calculating the average and hypothesis. The last problem-solving ability is to re-examine the answers and write the conclusions. The average problem-solving at the stage of reexamining in evaluation 1 is 75.67 and evaluation 2 is 79.75 and both are in a good category. The overall average is 77.71. This is because most students don't check again when the questions are finished. Besides, students also did not write back the conclusions of what was completed. Students assume that when a question is finished it is finished and there is no need to rewrite the results. The results of the study indicate that in the problem-solving process, the lowest average is at the stage of preparing a plan, this is in line with research conducted by [22], where Davis, et al stated that the majority of students do not know how the right solution or step to solving the problem. [12] also stated that in solving problems a Polya procedure can be used. This is because the Polya procedure is very effective and can help students in understanding mathematical problems.

4 CONCLUSION

Based on the results of research that has been carried out on the implementation of the learning process, problem solving skills, and responses by applying the jigsaw method with a metacognitive approach, it was concluded that the application of the jigsaw method with a metacognitive approach to social statistics material as a whole was carried out in accordance with the learning steps of the jigsaw method. Student activities show the average results of overall student activity is
82,175. Student responses to the application of the jigsaw method with a metacognitive approach can be said to be very good because the average of all components obtained an average of 86,67 which contains indicators of interest, understanding, and implementation. While the level of problem-solving abilities of students after using the jigsaw method with a metacognitive approach gets an average of 79,6 or in either category. Students mostly experience difficulties at the planning stage. This is because students are confused about what steps will be used in problem-solving.

REFERENCES