Students’ activeness in jigsaw type cooperative learning and rank 1 games on sets topic

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Abstract. Student activity in learning is essential so that learning objectives can be achieved. This study aims to describe the activeness of students in the application of Jigsaw cooperative learning and Rank 1 games on the topic of sets. This research was conducted at Universitas Negeri Malang school year of 2019/2020. The method used is quantitative descriptive. In this study applied Jigsaw type cooperative learning and Rank 1 games. At the same time, the research subjects were the 5th-semester students who were taking the Social Mathematics course, in the topic of mathematical sets, Undergraduate Mathematics Education Program of Universitas Negeri Malang year 2017 with a total of 30 students. Based on the analysis results of students’ activeness observation, an average percentage of 91.83% was obtained. It shows that the students’ activeness in the Social Mathematics course, especially on the topic of sets, was categorized as excellent.

1. Introduction
Mathematics is one of the subjects taught in elementary school, junior high school, senior high school, university and public schools. According to [1], it is important to learn mathematics as a pleasant need in our daily life. But apparently mathematics is still considered as a difficult subject and is feared by students. Though mathematics is a compulsory subject that must be mastered by the students. Some students assume that mathematics is boring and not interesting because they found the mathematics difficult and complicated.

Observation results showed that during the learning process, one group was being appointed to present one of the Social Mathematics material by using Power Point media, then exercise questions were given. When one of the groups was doing presentation, some other students paid less attention. It could be seen that the students’ activeness was less during the learning process. The low level of the students’ activeness could be seen when the lecturer was giving questions and the students did not want to express their opinions. Even when the students wanted it, only a few of them that were able to answer the questions correctly. In addition, the low level of activeness could be seen from the number of students who were not paying attention to the lecturer’s explanation.

Based on the observation result above, it was obtained that the problems that caused the low level of the students’ activeness in the learning process was the less varied teaching method and the students were less involved in the learning activities. That learning process had caused the lack of students’ learning activeness so that the students tended to be passive in learning and lacked of understanding of the material presented. The method used was always the same in every learning process so that it caused the students to feel bored and tired. As a result, the learning process was not effective and the expected learning objectives were not achieved. In order to let the participants to be actively involved in the
learning process, it is necessary to apply a learning model that makes the students play active roles during the learning process, namely the cooperative learning.

One of the learning models that uses a constructivist approach is the cooperative learning. The cooperative learning model is one of learning models that supports contextual learning [2]. In general, cooperative learning has a positive impact on the field of mathematics education [3–5]. According to Davidson & Kroll related to the cooperative learning models, the students are not required to achieve success individually or to defeat their colleagues, but the main thing is that they are required to work together to achieve the results together [6]. In this model, social aspects are very prominent and students are required to be responsible for the success of their group. Thus, the Jigsaw type cooperative learning and Rank 1 games are needed to improve the students’ activeness in a learning process.

Jigsaw type cooperative learning is a learning model in which several small groups is formed, and in each one of the groups there must be one student who will be responsible to master the subject material and that one student must be responsible to teach the material to other groups and his/her own group [7]. This is in line with the opinion of Arends, which stated that Jigsaw type cooperative learning was a type of cooperative learning that consisted of several members in a group called the expert group that were responsible to master a particular part of the material and to teach the material to the other members in his/her own group (referred to as origin group) [8]. This means that each student in his/her own group are required to master the material that needs to be taught to his/her group mates. By the means of teaching others, it is expected that the students will understand the material better.

According to [9], the steps needed in using Jigsaw cooperative learning can be divided into three phases. First, The Cooperative Phase in which the students are divided into several small groups with 5 or more students in each group. This group is called the cooperative group and will receive some information or readings from a package of information that needs to be discussed/solved in the cooperative group. Second, The Expert Phase in which the members who get a specific assignment need to do the following things: (a) learn together and become an expert in a predetermined field of information (reading); (b) find a way to teach the information (reading content) that has been mastered into their own cooperative group. Third, The Five Series Phase in which the expert group members return to their respective cooperative groups (initial group). Automatically, the quality of problem solving will be better because the problem will be solved together by experts in their respective fields [8].

The cooperative learning models has been researched by several researchers [10–12]. The Jigsaw type cooperative learning models has been researched by [13–19]. While the students’ learning activeness has been researched by [14,20–22]. From the background shows that student learning is still lacking and based on several studies already mentioned, researchers are interested in researching about student activity. The activity of the students studied is at the time of learning on the topic of set using cooperative learning type of Jigsaw and Games Rank 1.

2. Method
This research uses descriptive quantitative approaches. Data collected in this research will be analyzed descriptively. This research is the application of the Jigsaw type cooperative learning model and Rank 1 Games. This research describes the students’ learning activeness on the topic of mathematical sets by using Jigsaw type cooperative learning model and Rank 1 Games.

The subjects in this research were the 5th semester students who were taking Social Mathematics course in the topic of mathematical sets, Undergraduate Mathematics Education Program of Universitas Negeri Malang with the total of 30 students. The researchers who were also lecturers acted as one of the primary data sources. In addition, the data was also obtained from the observation written by two observers on the observation sheet(s).

The techniques used in collecting data in this research were the observation sheets, the test by using Rank 1 Games, and documentation. Observation sheets were used to obtain data related to the students’ activeness through the application of Jigsaw type learning model and Rank 1 Games, and also as a documentation during the learning process. The research instrument used by researchers to retrieve the data was the observation sheets.
The data obtained from this research were the data related to the students’ activeness during the learning process. This data was expected to be able to show whether the Jigsaw type cooperative learning and Ranking 1 Games could increase the students’ activeness or not. The data was collected by using observation and questionnaires. The data analysis of the students’ learning activeness and questionnaire results were as follows:

2.1. Students’ Activeness

Students’ learning activeness was observed by using observation sheets of students’ learning activeness which contained indicators of the activeness that needed to be achieved by the students. The assessment on this observation sheets was done by determining each of the student’s activeness percentage. The students’ success percentage was obtained by the formula \[ \frac{\text{total score}}{\text{maximum score}} \times 100\% \] [23]. While the percentage criteria for student activity can be seen as in table 1.

| Percentage | Category    |
|------------|-------------|
| 75% < score ≤ 100% | Excellent   |
| 50% < score ≤ 75%  | Good        |
| 25% < score ≤ 50%  | Fair        |
| 0 ≤ score ≤ 25%    | Poor        |

The students’ activeness indicators being observed were as follows: (1) pay attention to the explanations of the lecturer or friends; (2) read the module or search other references related to the material assigned by the lecturer; (3) discuss the material assigned by the lecturer with other group members who have the same task (expert group); (4) explain to group (the original group) members about a particular learning material that has been mastered; (5) give question if there is a particular learning material that is not understood yet; (6) answer question from the lecturer or friends; (7) express opinions about the material being discussed; (8) listen to the explanation of the lecturer or friend; (9) make a summary or note of the discussion result with the expert group and the original group; (10) solve problems given by the lecturer.

2.2. Students’ Responses Questionnaire

The results of the students’ responses questionnaire had been analyzed based on the students' opinions regarding the Jigsaw type cooperative learning model and Rank 1 Games, then the result was tabulated. The percentage value of each response was calculated by using the formula \[ \frac{\text{total score}}{\text{maximum score}} \times 100\% \].

| Percentage | Category       |
|------------|----------------|
| 75% < score ≤ 100% | Strongly agree |
| 50% < score ≤ 75%  | Agree          |
| 25% < score ≤ 50%  | Disagree       |
| 0 ≤ score ≤ 25%    | Strongly disagree |

This research is considered to be a success if at least 75% of the students were active. The students were said to be active if the students’ activeness percentage (SAP) > 50%, and if the average result of the students’ responses questionnaire was at least 50%.
3. Results And Discussion

Based on the initial observation that had been done, the students’ activeness level was categorized as moderate. Even several indicators showed that there were some students that was categorized as low (poor), indicated by the small number of students who were active in answering questions given by the lecturer as well as their own friends. For this reason, a learning process that could improve the students’ learning activeness was needed. The application of the Jigsaw type learning model and Rank 1 Games in this research was carried out in one meeting only. After the application was done, it could be seen that the students’ activeness has increased. From the increased in the students’ activeness during the learning process, the students have become accustomed to solve problems themselves or as a group, resulting in an increase on their learning outcomes.

In this research, the students were divided into 5 groups that were called as the original groups. Each student was being assigned to different materials related to the existing RPS (learning plan). And then, the lecturer directed students to gather with other students who were assigned to the same material to form a new group called the expert group. Then after their discussion in the expert group, the students returned to their respective original groups to exchange opinions about the material they had obtained from the expert group. After that, all the students participated in the Rank 1 Games in which the students needed to answer a number of questions as a means of measuring the students’ understanding related to the mathematical sets learning material. The students were required to answer the questions according to their respective capability in a specified time duration. Each question had several points so that all the students got the same opportunity to collect as many points as possible. Then, the points would be accumulated in their original groups to determine the winning group.

In this research, the researchers analyzed the observation result that had been completed by the observers in the observation sheets.

3.1. Observation Result of Students’ Activeness

| Observed Indicators                                                                 | Percentage | Category |
|------------------------------------------------------------------------------------|------------|----------|
| Pay attention to the explanation of the lecturer or friends                        | 98.33%     | Excellent|
| Read the module or search for other references related to the material assigned by the lecturer | 95.83%     | Excellent|
| Discuss the material assigned by the lecturer with other group members who have the same task (expert group) | 90.00%     | Excellent|
| Explain to group (the original group) members about a particular learning material that has been mastered | 93.33%     | Excellent|
| Give question if there is a particular learning material that is not understood yet | 90.00%     | Excellent|
| Answer question from the lecturer or friends                                       | 90.83%     | Excellent|
| Express opinions about the material being discussed                               | 90.00%     | Excellent|
| Listen to the explanation of the lecturer or friend                               | 90.00%     | Excellent|
| Make a summary or note of the discussion result with the expert group and the original group | 86.67%     | Excellent|
| Solve problems given by the lecturer                                             | 93.33%     | Excellent|
| **Average**                                                                        | **91.83%** | Excellent|

Based on the observation result (Table 3), it can be seen that the students’ activeness average percentage is 91.83%. This shows that the students’ activeness in the Social Mathematics course, especially the topic of mathematical sets, was excellent. Meanwhile, the measurement of the Jigsaw learning model and Rank 1 Games application were obtained from the students’ responses questionnaire.
after finishing the learning process. Among the indicators of activeness, pay attention to the explanation of the lecturer or friends had the highest percentage, which was 98.33%. This shows that Jigsaw cooperative learning can make students more enthusiastic in paying attention to explanations from friends or lecturers. These results are in line with research by [24][25][26] who find that through cooperative learning, students are more enthusiastic and actively interact between students and lecturers, student collaboration activities in groups and student participation are increased. This also shows the importance of peers to improve their mathematical abilities [27].

The indicator make a summary or note of the discussion result with the expert group and the original group obtained the lowest percentage of 86.67%. This indicates that this indicator needs to get attention from the lecturer. Students are still not accustomed to making a summary. However, despite the lowest percentage, it is still in very good category. Making a summary is an important factor in learning. This activity trains students to communicate mathematical ideas in writing [28] and make the ideas easier to understand [29].

3.2. Result of Students’ Responses Questionnaire

Based on the result of the students’ responses questionnaire, it can be seen that almost all of the students (96.67%) felt that the learning process that used the Jigsaw model and Rank 1 Games was very interesting and fun, especially in the topic of mathematical sets. All of the students (100%) agreed that the learning process that used Jigsaw model and Rank 1 Games was able to make them more active during the learning process. This results in support of the research results [24] which said that through cooperative learning, learners are more actively engaged in the learning process. Jigsaw learning model and Ranking 1 Games also helped the students in solving problems related to the topic of mathematical sets as it is shown that there were 83.33% students who were “agree”.

As much as 83.33% of the students became more familiar with the learning material and didn’t find it difficult in solving mathematical problems related to the topic of mathematical sets. As many as 96.66% of the students agreed that the use of Jigsaw model and Rank 1 Games was able to help them to be confident in expressing their opinions. As much as 80.00% of the students agreed that Jigsaw model and Rank 1 Games also encouraged them to find new ideas. This result is in accordance with research conducted by [13][30] who found that the Jigsaw learning model had a significant effect namely increasing student academic achievement.

From the results of the discussion above and see some of the results of research from previous researchers, it can be concluded that the activeness of students who take social mathematics courses using cooperative learning type Jigsaw and Rank 1 Game is categorized as very good, and very good response.

4. Conclusion

Based on the results of the research, it can be concluded that the Jigsaw type cooperative learning and Rank 1 Games are able to increase the students’ learning activeness in the Social Mathematics course, especially the topic of mathematical sets. After the application of Jigsaw learning model and Rank 1 Games, students’ activeness percentage of 91.83% was obtained. It means that the students’ activeness was “Excellent”. This shows that Jigsaw type cooperative learning and Rank 1 Games can increase students’ learning activeness.

5. References

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