



Implementation of Group Investigation (GI) Cooperative Learning Model to Improve Students' Critical Thinking Skills in Biology Subject

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Abstract

Students' critical thinking is needed, because during the learning process students develop ideas about the problems contained in learning. The aim of this research was to improve students' biology critical thinking skills. This research was conducted in the even semester of the 2013/2014 academic year. This type of research was classroom action research (CAR) with three learning cycles. The data sources of this research were an assessment using learning activity of observation sheets and student learning outcomes tests. The data obtained were analyzed using qualitative and quantitative data analysis. The success of the students' activity action in cycle I with a mean score was 3.25 with percentage was 81.54%; Cycle II amounted to 3.2 with percentage of 80,05% and in cycle III amounted to 3.61 with percentage of 92%. Students' critical thinking skills in cycle I were 62.18 with percentage was 25.64%. The average achievement of students' critical thinking skills test in cycle II was 83.08 with percentage was 94.87%. The average achievement of students' critical thinking skills test in Cycle III reached 85.38 with percentage 97.43%. Based on the results of the research conducted, it was concluded that the application of the GI type of cooperative learning model could improve the student's activity and students' critical thinking skills in the material of the immune system at class XI IPA3 of Senior High School 2 Kendari.

Keywords: Group Investigation, Student Activities, Critical Thinking.

A. Introduction

Education is basically an interaction between educators and students to achieve goals. In education, it involves the teaching and learning process which is the core of the overall educational process with the teacher as the main role in efforts to teach and educate students.

School is a formal educational institution that has the responsibility to educate the students. The students' success in the school is determined by the success of implementing teaching and learning activities, namely the integration of teachers' and students' activities. In improving the quality of teaching and learning activities, many efforts can be done by teachers to the pattern of teaching and learning activities, in this case the creation of effective teaching and learning situations that can support students' success in learning and the success of teachers in teaching.

In the learning process, teachers play dominant role (*teacher centered*) in most educational practices. According to Anderson, the teacher dominates all learning activities than students, so that most students become passive (Rosdiana et al, 2014). This cause the students in learning process were not given the opportunity to develop their processing skills.

Based on the observation of class XI IPA3 of Senior High School 2 Kendari, several problems were found. Most of students did not active in teaching and learning process because they were not given the opportunity to develop their critical thinking skill. Then, the students were not brave to ask questions to the teacher if they did not understand the material that had been presented. The teacher only gave more material so that learning seems to be memorizing.

Critical thinking is a type of convergent thinking, which is leading to a point. Critical thinking is a directional and clear process used in mental activities such as problems solving, making decisions, persuading, analyzing of assumptions, and conducting scientific research. Efforts to improve critical thinking skills are one of the duties and responsibilities of a teacher or professional educator. One of the efforts to improve the quality of teacher's teaching activity is improve learning patterns by applying learning models that are considered effective and efficient. Therefore, teachers should be able to find the model of learning that involve the students in the learning process. So, the learning objectives can be achieved effectively, efficiently, and students' critical thinking skills can be improved. The learning model applied was cooperative learning model with *group investigation type*.

The group investigation model is a learning model that trains students to participate in the development of social systems and gradually learn how to apply scientific methods to improve the quality of society. Through negotiation, students learn academic knowledge and they are involved in solving social problems (Cahyo, 2013). In Group Investigation, students work through six stages namely: identifying topics and organizing students into groups, planning assignments to be studied, carrying out investigations, preparing final reports, presenting final reports, and evaluating (Slavin, 2005). In line with this, the research conducted by Padaunan (2011) concluded that research using the Group Investigation learning model can improve learning achievement in Biology on the subject of growth and development of living things at Junior High School of Wundulako-Kolaka. Teachers can use the group investigation cooperative learning model as an alternative for teaching Biology.

Based on this explanation, the group investigation cooperative learning model is important to be applied in Biology learning. It can improve students' critical thinking skills to encourage them to think in examining the biological concepts that they are learning on the Immune System material at Grade XI IPA3 of SMAN 2 Kendari.

B. Literature Review

1. *Group Investigation Learning Model*

The group investigation model is a learning model that trains students to participate in the development of social systems and gradually learn how to apply scientific methods to improve the quality of society. Through negotiation, students learn academic knowledge and they are involved in solving social problems (Cahyo, 2013).

In this model, students are involved in planning about the topics to be studied and how to carry out the investigation. Both of these require norms and class structure that more oriented to the students and it is more complex like other types of cooperative learning. In a group investigation, students are organized into cooperative groups of 5-6 students. Students in their groups choose certain topics to study, design a depth investigation of the subtopics of the lesson then prepare and report the results to all students (Jufri, 2013).

Slavin (2005) in Group Investigation explains that students work through the following six stages: identifying topics and arranging students into groups, planning assignments to be studied, carrying out investigations, preparing final reports, presenting final reports, and evaluating.

2. *Critical Thinking Skill*

Critical thinking is a directional and clear process used in mental activities such as solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research. Critical thinking is the ability to argue in an organized way. Critical thinking is the ability to systematically evaluate the weight of personal opinions and the opinions of others (Johnson, 2012). Then, critical thinking is the application of aspects of learning outcomes which is rational, logical, and supports the success of students. Therefore, it is also important for someone to learn about how to think critically, because someone is not automatically fluent on it without going through the learning process. The teachers need an effort to teach students how to think critically at school. The low critical thinking skills of students is one of the main problems in learning at school. Then, lack of attention to the use of thinking skills where these attentions can be used as indicators of the quality of learning outcomes (Cahyo, 2013). In learning and practicing critical thinking, students need to be facilitated to practice developing several indicators of critical thinking such as: (1) identifying events, events, processes, and activities; (2) identifying the relationship between events, objects, and events, (3) deducing implications or impacts; (4) deducing the motive; (5) combining free elements to create new mindsets that lead to the development of creativity and (6) making original interpretations as a form of creativity Cahyo (2013)

In line with this, Ennis in Susiarty (2011) explains that there are 6 basic elements in critical thinking which are abbreviated as FRISCO: F (Focus) to make a decision about what is believed so that it must be able to clarify the questions or issues that are available, R (Reason) know the reasons for or against decisions made based on relevant situations and facts, I (Inference) makes reasonable conclusions, S (Situation) understands and always maintains the situation in thinking, C (Clarity) explains the terms used, and O (Overview) steps back and thoroughly examines the decision taken.

Beyer in Desmita (2009) explains that there are at least 10 critical thinking skills that students can use in proposing arguments or making valid considerations, namely: (1) skills to distinguish facts that can be verified and values that are difficult to verify (to be verified); (2) differentiate between relevant and irrelevant information, claims or reasons; (3) determine the factual accuracy (truth) of a statement; (4) determine the credibility (trustworthiness) of a source; (5) identify ambiguous claims or arguments; (6) identify assumptions that are not stated; (7) detecting bias (finding irregularities); (8) identify logical fallacies; (9) recognizes logical inconsistencies in a line of reasoning and (10) determines the strength of an argument or claim.

C. **Methodology**

1. *Research Design*

This research was conducted in the even semester of the 2013/2014 school year on the subject of the immune system at Senior High School 2 Kendari. The subjects of this research were students of class XI IPA3 at Senior High School 2 Kendari with a total of 39 students consisted of 16 male students and 23 female students. This type of research was classroom action research (CAR) with three learning cycles. Classroom Action Research (CAR) is an action research conducted in class, namely research which is conducted by teachers in their own class through self-reflection, with the aim of improving their performance as teachers so that students' learning outcomes increase (Wardhani & Kuswaya, 2011).

The characteristic of CAR is that there is a cycle of action to improve the learning process in the classroom. In this study, it was carried out in three cycles, each of which consisted of two meetings with the subject of the immune system.

2. *Instruments*

The success indicator in this research was a learning outcome test which refers to an indicator of increasing critical thinking skills. It was consisted of the ability to provide explanations, analyze images, express opinions, compare and analyze information, and classify. The instrument used in the study was a test in term of essay test and student's observation sheet. Essay test was used to see the students' learning outcomes in the form of cognitive aspects. Observation sheet was used to observe the students' activity during teaching and learning process

3. Technique of Data Analysis

The data collection procedure in this research were as follows:

- Conducting preliminary observations to identify problems in learning Biology at Senior High School 2 Kendari.
- Determining the class of research samples that are taught using the Group Investigation (GI) type of cooperative learning model.
- Conducting learning activities based on the schedule.
- Conducting an assessment of students' activities by observers using students' observation sheets.
- Giving the learning outcomes tests to the students that contain Biology subject matter on the subject of the immune system.
- Analyzing students' learning outcomes tests and then tabulated.

The data in this research were analyzed using descriptive statistical analysis to provide an overview of the improvement of critical thinking skills in Biology students on the subject of the immune system by applying the group investigation type cooperative learning model. The steps in analyzing data on learning activities and students' critical thinking skills on the subject of the immune system were as follows:

- Data tabulation was made in the form of students acquisition scores on the observation sheet of student learning activities in cycles I, II and III as well as tests of students' biology critical thinking skills through tests in Cycles I, II, and III.
- The tabulated data were analyzed and then made tables and graphs to measure the success rate of learning activities and students' Biology critical thinking skills.
- The success of student learning activities was measured using the following formula:

$$\%KABS = \frac{\text{Number of Score}}{\text{The maximum number of scores}}$$

Information:

K = Success

A = Activity

B = Study

S = Student

(Usman & Setiawati, 1993).

- Students' biology critical thinking skills were measured using the following formula:

$$TPn = \frac{\sum Xn}{Xmaks} \times 100\%$$

(Poerwanto, 1990).

Information:

TPn = Level of Students' Critical Thinking Skills

$\sum Xn$ = Score of Students' Assessment to-i

Xmaks = The Maximum Score That Can Be Achieved by Students

- The average of students' learning activities and students' biology critical thinking skills were measured by the following formula:

$$\bar{x} = \frac{\sum x}{n}$$

Information:

\bar{X} = the average value obtained by students

n = The total score

N = The total number of students

(Sudjana, 2004).

- The implementation of the action in each cycle was successful if the students in the class got score KKM ≥ 75 .

D. Findings and Discussion

1. Findings

The results of this research were data of students' learning activities during learning activities and the achievement of students' critical thinking skills. The data were analyzed using descriptive statistics in the form of determining the percentage of mean score of students' learning. It provided an overview of students' critical thinking skills in Biology subject on the immune system material using the GI type cooperative learning model.

a. Students' Learning Activities of Cycle I

Table 1. Analysis of students' learning activities in learning of cycle I

No	Student Learning Activities	Group							Average (%)
		1	2	3	4	5	6	7	
1.	Identifying the given topic	3,5	4	3	3,5	4	4	4	3,71 (92,85)
2.	Formulating the main problems	3,5	3	2,5	3,5	4	4	4	3,5 (87,5)
3.	Determining the consequences of a decision taken	3	3	3	2,5	4	3,5	4	3,28 (82,14)
4.	Reflexing the existence of opinion bias based on different points of view	3	3	2,5	3	2,5	2,5	3	2,78 (69,64)
5.	Disclosing data, definitions or theories in solving problems	3,5	2,5	2,5	3	3,5	3,5	4	3,21 (80,35)
6.	Evacuating the relevant arguments in solving the problem	3,5	3	2	2,5	3	3,5	4	3,06 (76,78)
Average		3,33	3,08	2,58	3	3,5	3,5	3,83	3,25
Percentage (%)		83,3 3	77,0 8	64,5 8	75	87,5	87,5	95,83	81,54

Based on Table 1, the average score of students' learning activity during the learning process in the Cycle I was 3.25 with the total percentage was 81.54%. After the implementation of Cycle I which was carried out for two meetings was completed, then an evaluation was carried out according to the test items for evaluation on action Cycle I. The test results showed that the average score of the students obtained was 62.18, which means that about 25.64% of the success of the first cycle.

Based on the results of evaluation and observation on the implementation of the action in Cycle I, it did not reach the target performance of indicators and were not in accordance with what was expected in the learning scenario, or in other words there were still deficiencies or weaknesses that occur in the implementation of cycle I. Therefore, based on the result of the observation, researcher and teacher discussed and agreed upon deficiencies or weaknesses, among others: only a few students explored their initial knowledge in the initial activities, not all of them focusing their attention on the subject matter by answering questions raised by the teacher and students were less likely to observe knowledge and understanding in applying concepts and changing thinking.

b. *Students' Learning Activities of Cycle II*

Table 2. Analysis of students' learning activities in learning of cycle II

No	Student Learning Activities	Group							Average (%)
		1	2	3	4	5	6	7	
1.	Identify the topic given	3,5	4	2,5	3	4	4	4	3,57 (89,28)
2.	Formulate the main problems	3,5	3,5	2,5	2,5	4	3,5	4	3,95 (83,92)
3.	Determine the consequences of a decision taken	3	4	2	2	3,5	4	3	3,07 (76,78)
4.	Reflexes the existence of opinion bias based on different points of view	4	3	2,5	3	3	3	3	3,07 (76,78)
5.	Disclose data, definitions or theories in solving problems	3,5	3	3	3	3	3	3	3,07 (76,78)
6.	Evacuate the relevant arguments in solving the problem	3	3	2,5	3	4	3	3	3,07 (76,78)
Average		3,4 1	3,4 1	2,5	2,75	3,58	3,41	3,33	3,2
Percentage (%)		85, 41	85, 41	62, 50	69	89,5 8	85,4 1	83,3 3	80,05

Based on Table 2, in the Cycle II found that the average score of students' learning activity during the learning process was 3.2 with the total percentage was 80.05%. In students' activity, there was a decrease in the mean from 3.25 with a percentage of 81.54% to 3.2 with a percentage of 80.05%. After the implementation of Cycle II which was carried out for two meetings was completed, and then an evaluation was carried out according to the test items for evaluation on the action of Cycle II. The test's result showed that the average value of the students obtained 83.08, meaning that about 94.87% of the success of the second cycle.

The weaknesses that found in Cycle II will be discussed with the observers. Then, it will be improved in the implementation of learning in Cycle III. The weaknesses were about students who were less active during group discussions and learning process.

c. *Students' Learning Activities of Cycle III*

The average score of students' learning activity during the learning process in Cycle III was 3.61 with a total percentage was 92%. In students' activity, there was an increasing in the mean score from 3.2 with a percentage of 80.05% to 3.61 with a percentage of 92% (Table 3).

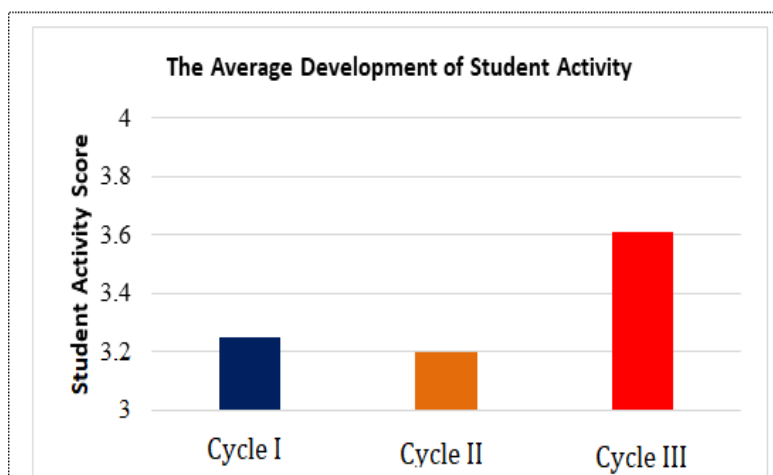
After the implementation of Cycle II was complete, then an evaluation was carried out according to the test items for evaluation in the action of Cycle III. The test results showed that the mean score of students obtained 85.38, which means score was about 97.43% of the success of the third cycle.

The results of observation, evaluation and reflection on the implementation of the action Cycle III were satisfactory. Teachers and students have been able to carry out learning with the GI cooperative learning model. There were no more basic weaknesses in the implementation of the action. Based on the results of observation and evaluation, it was concluded that the research was stopped in Cycle III, because the average of students' learning outcomes of biology increased from 62.18 in Cycle I to 83.08 in Cycle II and increased again in Cycle III, namely 85.38. The increasing of students' average achievement in the implementation of the action Cycle II amounted to 20.9 and in Cycle III of 2.3. This research has been achieved.

Table 3. Analysis of students' learning activities in learning of cycle III

No	Student Learning Activities	Group							Average (%)
		1	2	3	4	5	6	7	
1.	Identify the topic given	4	4	4	4	4	4	4	4 (100)
2.	Formulate the main problems	4	4	3	3	4	4	4	3,71 (92,85)
3.	Determine the consequences of a decision taken	4	3	4	4	4	4	3	3,71 (92,85)
4.	Reflexes the existence of opinion bias based on different points of view	3	3	3	4	3	3	3	3,14 (78,57)
5.	Disclose data, definitions or theories in solving problems	4	4	4	3	3	3	3	3,42 (92,3)
6.	Evacuate the relevant arguments in solving the problem	4	3	4	4	4	3	4	3,71 (92,85)
Average		3,83	3,5	3,66	3,66	3,66	3,5	3,5	3,61
Percentage (%)		95,38	87,5	91,66	91,66	91,66	87,5	87,5	92

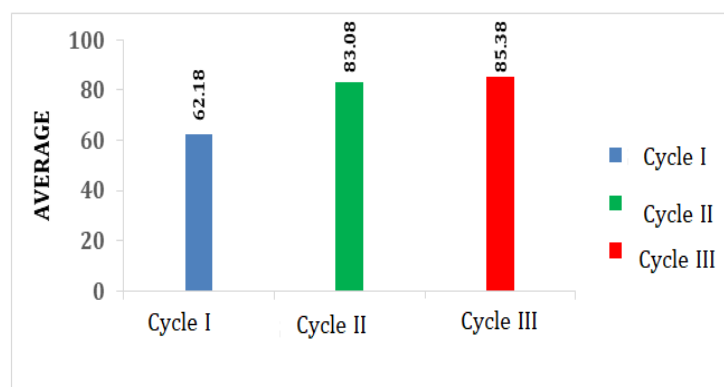
By achieving the performance indicators in this study, it means that the learning objectives have been achieved, namely improving the learning outcomes of biology learning in class XI IPA3 of Senior High School 2 Kendari through the groupinvestigationtype cooperative learning model



Graph 1. Average score of students' activities of cycles I, II and III during the learning process

The improvement of students' learning outcomes from Cycle I, II, and III can be seen in the following Graph.

The average of students' learning outcomes in the Cycle I was 62.18. In the Cycle II, the average score of students' learning outcomes improved to 83.08. However, there were still some weaknesses in this cycle. It was improved in Cycle III, namely 85.38 (Graph 2).



Graph 2. The Average Score of Students' Learning Outcomes in the Cycles I, II, and III during the Learning Process.

2. Discussion

This research is a classroom action research which consisted of three cycles. Each cycle was consisted of two meetings which are held in accordance with the research procedure and this research ends after the implementation of cycle III because the predetermined performance indicators have been achieved. This research was conducted to determine students' activities and students' critical thinking skills in Biology subjects in the subject of the immune system through the groupinvestigation cooperative learning model.

Based on the analysis of students' activity data in the learning process of cycle I, it was found that the mean score of students' activity was 3.25 with a percentage of 81.54%. It shows that the implementation of the groupinvestigation cooperative learning model has been carried out well, but there are still deficiencies that must be fixed, including the guidance provided by the teacher for group discussion activities, the teacher has not been able to show his/her role as good teacher, there are still some students who do not dare to propose question if they don't understand. According to Annurrahman (2009), attitudes towards learning will be seen from the seriousness of taking lessons or vice versa, for example, not being serious in asking or expressing opinions. Activeness is also included in learning resources which are a combination of a technique with other sources (Mulyasa, 2009: 158).

From the results of the action test in cycle I, the average score of the students was 62.58. The low score of students in the cycle I was due to several reasons, among others, because students were not used to learn with the groupinvestigationcooperative learning model and there were still many students who did not master the concept of material described by the teacher.

The average score in the observation of students' activity at cycle II was 3.2 with a percentage of 80.05%. The activity of cycle II have decreased from cycle I. It shows that the average score was 3.25 with a percentage of 81.54% have decrease to 3.2 with a percentage of 80.05% with a mean difference of 0.06 with a percentage of 1.49%. This is because there are still deficiencies that must be fixed, including several components in the learning scenario that are not implemented all because lack of time to implement the whole learning scenario, the guidance and motivation provided by the teacher for group discussion activities was not effective yet. There were still students who have not been able to express their opinions.

From the results of the action in cycle III, the average score of students increased from 62.18 to 83.08 with a difference of 20.9. This improvement is because students have begun to master the concept of subject matter and started to ask questionsfrequently related to lessons that have been studied both in and out class. Learning by applying the group investigation type learning model invites students to take an active role in learning because students are faced to problematic situations and tried to find solutions to increase activity, cooperation, and learning outcomes. Through activeness, cooperation and learning outcomes in learning can improve students' understanding of the material (Suprijono, 2011: 39).

Based on the analysis of the action observations in cycle III, the average of students' activity was 3.61 with a percentage of 92%. It shows an improvement of students' average score from 3.2 with a percentage of 80.05% to 3.61 with a percentage of 92% with a difference of 0.41 with a percentage of 11.95%. From the results of the action test in cycle III, the average score of students increased from 83.08 to 85.38 with a difference of 2.3. This improvement is because

students were familiar with the applied learning model and have been able to master the concept of subject matter. This is in accordance with the opinion of Wena (2009: 35) which states that the application of the group investigation cooperative learning model can train students to have good abilities in communication and in group process skills, train students to foster activeness, collaboration, and improve learning outcomes. The use of group investigation learning model by the students could run effectively and efficiently if it is supported by the skills of teachers in class management. All components in the learning scenario have been implemented properly as expected and all of the indicators have been reached, so that the research was stopped at cycle III.

Based on the results of observations from cycle I to cycle III there was a changes in student's attitudes such as students became more motivated to learn. This can be seen that students pay less attention to the subject matter provided by the teacher at cycle I, in contrast, after cycle III students were more focused on paying attention to the material provided by the teacher.

From the description above, it can be concluded that the critical thinking skills at class XI IPA3 of Senior High School 2 Kendari can be improved through the group investigation type of cooperative learning model.

E. Conclusion

Based on the results of the research conducted, it was concluded that the application of the group investigation cooperative learning model could improve students' critical thinking skills in the material of the immune system at class XI IPA3 of Senior High School 2 Kendari. It can be seen from the result of this research. After implementing the Group Investigation cooperative learning model, the average score of students' learning outcomes from 62.18 improved to 83.08 in cycle II. Then, in cycle III, it showed an improvement in the average score of learning outcomes to 85.38. Students' learning activities in cycle I reached a mean score of 3.25 with a percentage of 81.54% decreased to an average score of 3.2 with a percentage of 80.05% in cycle II. In cycle III, the average score of the students' activity increased to 3.61 with a percentage of 92%. It is because the learning model was applied with more opportunities for students to explore the knowledge that they had regarding to the material, expand students' opportunities to participate actively in learning, increase students' ability to express their opinions regarding the material being taught. So, critical thinking skills and student activities can increase by using Group Investigation cooperative learning model.

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