
Improved Communication and Critical Thinking Skills Based on Inquiry From Physics Education Students in Earth Physics Materials

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Abstract: This study aims to improve communication skills and critical thinking by implementing inquiry-based learning and carried out through classroom action research. This study was carried out on even semester students of earth physics courses in Riau physics education study program totaling 35 people in the 2017/2018 school year. Data collected through observation sheets and understanding concepts that were analyzed descriptively using percentages. The results of the data analysis concluded that there was an increase in communication skills by 20%. The results of the analysis of critical thinking for cycle I with 2.9% were categorized as very good and for the less well with 25.7% while for cycle II the category was very good with 40% increasing to 37.1%. Based on the results of the analysis it can be concluded that the ability of communication skills and critical thinking of students increases. This means that inquiry-based learning can improve communication skills and critical thinking in physics education students.

Keywords: Communication skills, Critical Thinking, Inquiry

1. Introduction

Physics is one of the lessons that is closely related to how to systematically find out and study phenomena and natural phenomena. Therefore, physics subjects are very good at training and improving students' ability to reason, analyze and think critically. Earth physics courses are one of the compulsory subjects in the Department of MIPA Education, which is a subject that must be taken by students in the Physics Education Study Program. This course usually conducts learning by being given assignments, working in groups and individuals. Sometimes students also do assignments to make group papers and discussions which are then presented in front of the class.

Students often experience difficulties in communicating tasks appropriately according to the demands of the lecture material. The difficulties faced by students in the learning process are aspects of communication skills in the learning process, students tend to pay less attention to effective communication procedures both verbally and writing, so that the products produced by students only fulfill the duties of the lecturers' routine tasks and do not describe communication skills. which suits the demands of scientific communication. Sometime student needs to improve their understanding by using some media in the learning the earth physics (Islami, 2018)

In the aspect of critical thinking skills, an indication of involvement when students conduct question and answer discussions in class discussion forums. Most of the questions and answers have not described a quality of critical thinking in solving a problem that is an important issue in the topic of discussion. This results in the learning process not being maximized in solving problems that should be obtained by the lecturer in a planned manner, the ability to think everyone needs that is a high level of thinking ability, which is a determinant in achieving success and Critical thinking framework for any discipline Duron R., dkk. (2006). A learning should be able to train memory skills and understanding and skills in solving new problems so as to improve understanding of the material presented. One of the lessons that can improve students' understanding is the inquiry learning model. Inquiry in English inquiry, means questions or checks, investigations. Inquiry as a learning process based on search and discovery through a systematic process of thinking, (Wina Sanjaya, 2006). This inquiry learning emphasizes on a problem that will be solved by students so that students can think critically and analytically to find and find their own answers to a question in question so that the material obtained by students will be more easily understood (Saepuzaman, 2011). This is evidenced by Bukhori (2012) with its stated that inquiry-based learning can improve the results of understanding the concept of physics which is seen from the results of understanding concepts in cycle I (67.33), cycle II (71.11), and cycle III (71.58). In addition, this learning also encourages students to interact with each other so that communication will be established during discussions and presentations.

Of the several problems that occur, it is necessary to take steps to improve the lecture process of Earth Physics, besides students are expected to be able to master the content aspects of lecture material as well as other aspects of skills such as communication and critical thinking are urgent in developing the competence of the lecture by applying inquiry-based learning models, so that it is expected to improve students' communication and critical thinking skills.

2. Methodology

The type of research used is classroom action research (CAR). This research design refers to the action research design proposed by Kemmis & Mc Taggart (1988) and Zuber-Skeerit (1996) where one round of cycles consists of several steps, namely Planning, Implementation, Observation, Evaluation and Reflection. This research is one of the efforts of lecturers or practitioners in the form of various activities carried out to improve and or improve the quality of classroom learning (Arikunto, 2011).

Step 1 is planning, activities are carried out namely planning inquiry learning, preparing learning media, making observation sheets about communication skills that will be observed in students. Next, make a matter of understanding the concept, analyzing and reflecting the results of class actions. In the implementation of the first cycle was made in the form of RPS in the earth physics course, which was divided into preliminary activities, core activities and closing activities by referring to the syntax of inquiry-based learning models.

Step 2 is the implementation of learning activities that are in accordance with the RPS and each student's closing activities are given a matter of understanding the concept. Step 3, observations were made during ongoing learning and observation of communication skills carried out at the core activities only, namely when students were discussing. Student communication skills are also seen from the results of student reports. Step 4 is evaluation and reflection, it is identified

the shortcomings that are seen in the pda when the learning process takes place to be used as a reflection or improvement material that will be applied in the next cycle.

This research was conducted with the subject of even semester students of the physics education program FKIP Riau University 2017/2018 academic year. Data collection techniques were carried out using observation instruments, questionnaires and problem solving tests. After the data is collected, the data is analyzed through three stages, namely data reduction, data exposure and conclusion.

3. Result and Discussion

3.1 Results of Observation of Oral Communication Skills

Observation of oral communication skills carried out during the first and second cycle class discussion activities using observation sheets of oral communication skills and carried out by observers included three domains of communication skill indicator components namely 1) Organization 2) Eye contact 3) Delivery of information. To see the overall results of observations of students' achievement on the three domains of this skill component are explained in Table 3.1 and Table 3.2

Table.3.1. Recapitulation of Percentage of Achievement of Oral Communication Skills of Students in Cycle I

No	Kategori	Jumlah	Persentase
1	Amat Baik	11	31,4
2	Baik	10	28,6
3	Cukup Baik	12	34,3
4	Kurang Baik	2	5,7
5	Sangat Kurang	-	-

Table.3.2. Recapitulation of Percentage of Achievement of Oral Communication Skills of Students in Cycle II

No	Kategori	Jumlah	Persentase
1	Amat baik	18	51,4
2	Baik	12	34,3
3	Cukup Baik	5	14,3
4	Kurang Baik	-	-
5	Sangat Kurang	-	-

Based on Table.3.1, the recapitulation of the scores achieved from the three components of oral communication skills in the first cycle can be revealed that the percentage of students who mastered oral communication skills when they were presenting in front of the class was almost half as good, whereas in cycle II it can be revealed that more than half of students who master oral skills with a percentage of 51.4%.

Student communication skills through presentation activities in front of the class discussion forum, obtained the description that in carrying out the presentation activities and when organizing the material to be conveyed to the forum participants, classified as only a small part the presenters were able to organize the material delivered very well in cycle I with a percentage 34.3%. Students who make presentations, even though the material presented has a logical or systematic sequence of material that is good enough but they have not been able to elaborate the material properly, seem too focused on the content presented on the power point slides and less

attempt to make the content more creative and informative. However, in cycle II, students have been able to do better in good communication skills and organize materials. This is evident in the second cycle more than half of students were able to organize very well with a percentage of 60%. This means that there is an increase in oral communication skills in the components of organizing as many as 27.5%.

Oral communication skills obtained notes about the obstacles faced by students in carrying out presentation tasks to report the results of group discussions. Constraints faced and need to be corrected are component indicators of eye contact. In the first cycle, shows that most of the presentations made by students are still focused on reading the power point slides and not paying enough attention to the audience, so that the report material delivered is less mastering the material presented to the audience. This is because students lack confidence from within students to appear in front of the class and feel they do not know each other when they first enter in cycle I. In cycle II explained that there was a tendency to improve the achievement of student skills in the eye contact component. In cycle II, almost half of the students during the presentation were full of confidence, maintaining eye contact with the audience and rarely returning to the notes of power point slides, this meant that there was an increase of 10% from the previous condition with a very good category.

In cycle I there were still students who mastered oral communication skills in the unfavorable category, amounting to 2 people, while in cycle II there were no more students who had oral communication skills in the unfavorable category. This indicates a 20% increase in the achievement of students' oral communication skills with inquiry-based learning. Students have shown their skills in communicating scientifically and effectively when communicating in front of the class.

3.2 Results of Critical Thinking Skills Tests

After going through the learning process that is carried out through two cycles, students' critical thinking skills experience a positive change. This can be seen through data from the analysis of critical thinking skills as explained in Table 3.2

Table 3.2 Comparison of Obtaining Percentage of Student Critical Thinking Skills in Cycle I and Cycle I

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5	Sangat Kurang	-	-

Table.3.2. Recapitulation of Percentage of Achievement of Oral Communication Skills of Students in Cycle II

No	Kategori	Jumlah	Perentase
1	Amat baik	18	51,4
2	Baik	12	34,3
3	Cukup Baik	5	14,3
4	Kurang Baik	-	-
5	Sangat Kurang	-	-

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Table 3.2 Comparison of Obtaining Percentage of Student Critical Thinking Skills in Cycle I and Cycle II

No	Kategori	Siklus I		Siklus II		Peningkatan
		JLH	%	JLH	%	%
1	Amat Baik	1	2,9	14	40,0	37,1
2	Baik	7	20,0	9	25,7	5,7
3	Cukup Baik	18	51,4	10	28,6	22,8
4	Kurang baik	9	25,7	2	5,7	20,0
Jumlah Total		35	100	35	100	

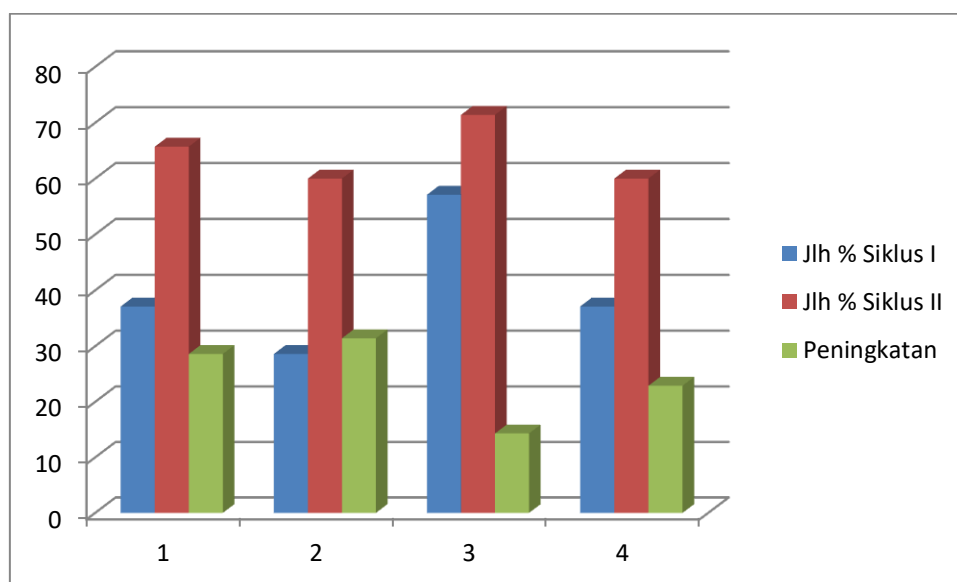


Figure 3.1 Comparison of Obtaining Percentage of Student Critical Thinking Skills in Cycle I and Cycle II

Based on the results of evaluations conducted that students' critical thinking skills have many obstacles including the components of critical thinking skills and this is reflected in the achievement of test results that have not been maximized in cycle I, that the majority of students still need more guidance in the next cycle of learning. It is also related that to conduct guidance activities that can produce a maximum critical thinking skill requires training and a long period of time because remembering in the process of changing the mindset of individual student habits can't be done in a short time. Limitations of the time the research was carried out requires researchers to design improvements that are appropriate, especially in the urgent compilation to be repaired which have low test results.

Based on Table 3.1. in the first cycle there were only 1 student who had a very good category and only 7 students (20%) had a score in the unfavorable category, while in the second cycle there were 14 students (40%) who had very good categories and only 2 students who get grades in the unfavorable category. This shows an increase in the percentage of the number of students

in all categories of scores resulting from their critical thinking skills scores in the second cycle through inquiry-based learning.

The results of the actions of inquiry-based learning in the second cycle turned out to be quite positive for students' critical thinking skills so that there was an increase in these skills. Indications of increasing critical thinking skills of students include more active forums of question and answer in discussions and more focused presentation of discussion material and arguments used by participants who generated many new ideas. In line with Faizi's opinion (2013: 97), Jacobsen et al (2009: 243) propose this inquiry process to begin by giving students problems in accordance with the content that will later become the focus of classroom activities, inside solving problems students make hypotheses or tentative solutions to problems who is facing, collecting data relevant to the hypothesis already created and evaluated the data until students find own conclusions.

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4. Conclusion

Inquiry-based learning can motivate students to ask, answer and argue. This shows that there is an increase in students' communication skills in earth physics physics course material. Through the process of inquiry learning also provides an improvement on students' critical thinking, so the question and answer forum in the discussion is more active and more focused on presenting material in discussions and giving opinions that generate many new ideas.

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