



Critical Thinking Skills Through Integration of Problem-Based Learning with Inquiry in Science Learning

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ABSTRACT

This study aims to determine students' critical thinking skills through an inquiry learning model with problem based learning. This research is classroom action research. The subjects of the study were all class VIII students of SMP Negeri 2 Rumbia, totalling two groups with 15 students in one group in accordance with the limited face-to-face learning rules in the era of the covid 19 pandemic. The test instrument used was in the form of open questions (essay form) according to the grid. Test The measured critical thinking skills are identifying and formulating problems, giving arguments, making deductions, conducting inductions, evaluating, deciding, and carrying out actions. The results showed that the problem-based learning model with Inquiry was effectively used to improve students' critical thinking skills. Students' critical thinking skills have increased from cycle one to cycle two, with an average pretest score of 50.25, while the post-test average score is 87.48. There was a significant increase in students' critical thinking skills in cycle 2 who were taught using the Problem Based Learning learning model with Inquiry, namely 37, 23.

Keyword: PBL, inquiry, critical thinking

INTRODUCTION

Efforts to improve the quality of education are continuously carried out both conventionally and innovatively. There are at least five main problems whose solutions must be prioritized, namely: improving the quality of education, increasing the efficiency of education management, increasing the relevance of education, equitable distribution of education services and character education. For this purpose, a fundamental change in the national education system is needed. These fundamental changes are related to curriculum changes. The curriculum in the education system is dynamic and must always be changed and developed to keep up with the changes and challenges of the times. Curriculum changes are deemed

necessary because they are based on several survey results that reveal that Indonesian students' position is still in the low category in terms of the ability to solve reasoning questions.

On the other hand, it was also found that there were several weaknesses in the previous curriculum, including the content and messages were still too dense, had not fully developed competencies (dominated by the knowledge aspect), and had not been responsive to changes both locally and globally (Bachtiar, 2014). The scientific approach is the basis of the 2013 curriculum by using various methods or learning strategies oriented to maximize students' thinking abilities. The most formidable challenge in the 21st century is how to improve students' thinking skills which include: critical thinking, problem solving,

creativity, and metacognition (Nurisya & Corebima, 2017). An appropriate learning method or strategy is needed to assess and improve students' thinking skills.

One of the learning methods or strategies included in the 2013 curriculum is an inquiry that requires students to be more active in the discovery process, placing students in more self-study and developing activeness in solving problems. The inquiry process is a special process to expand knowledge through research. Therefore the inquiry method is sometimes also called the scientific method of research. The inquiry method is a teaching method that seeks to lay the foundation and develop a scientific way of thinking. During the application of this method, students are required to learn more on their own and try to develop creativity in developing the problems they face themselves. The inquiry method will create effective and conducive learning conditions and simplify and expedite teaching and learning activities (Sudjana, 2004).

Based on the experts' opinions above, it can be concluded that the inquiry method is an instructional technique in the teaching and learning process of a problem. The main purpose of using the inquiry method is to help students develop scientific discovery skills. Inquiry can be a solution for teachers in science learning because, through this approach, it is hoped that it can provide students with a separate experience in understanding the subject matter. Teaching with the inquiry method is an experiential learning concept that gives students a set series of learning situations in the form of actual experiences designed by the teacher. Inquiry is a learning concept designed in the form of experiments and activities to find out the problems they face during the learning process. In addition to the inquiry method, problem-based learning (PBL) is also very suitable to be applied in the 2013 curriculum because it is a learning method that challenges students to "learn how to learn" and work in groups to find

solutions to real-world problems. This given problem is used to bind students to curiosity about the learning in question. Problems are given to students before students learn the concept or material relating to the problem to be solved.

Problem-based learning is a teaching approach that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills and acquire essential knowledge and concepts from the subject matter, train in higher order thinking, and learn how to learn. (metacognitive) and train students to become independent and self-regulated learners (Nurhadi et al., 2003; Arends, 2008). Goodnough & Cashion (2003) also stated that PBL could improve students' self-regulated or metacognitive skills. Nugraheni (2007) states that efforts to improve students' critical thinking skills are through problem-based learning (PBL). Trianto (2007) states that problem-based learning is an effective approach to improving students' critical thinking skills and is suitable for fields of science such as science and mathematics.

These statements are reinforced by the results of previous research that applies problem-based learning (PBL), showing an increase in learning outcomes, concept understanding, learning independence, critical thinking skills, motivation, interests, and learning activities in science, physics, chemistry subjects, mathematics, geography, and economics (Arnyana, 2004; Aisyah, 2003; Marpaung, 2005; Sudjana, 2002; Paidi, 2018). Dwiyoogo (2008) also stated that research on PBL confirmed that students develop skills that include: (1) problem solving, (2) critical thinking, (3) research, (4) presentation, and (5) moving vision to action. Therefore, applying PBL strategy as an alternative in learning is necessary to improve problem solving skills, critical thinking skills, metacognitive awareness, creativity, and cognitive learning outcomes.

PBL as a model, besides having advantages, there are also some disadvantages, among others, according to Sanjaya (2006) are: (1) students lack motivation to try when the problem is difficult, (2) if students do not understand what to solve the problem, they don't want to do it. Learning and (3) its success takes time. Weaknesses in PBL will be covered by collaboration with inquiry because this method requires a mechanism to motivate students to find out the problems they face through reading or experimenting. In addition, the time factor inquiry can be overcome because this model can be carried out during the learning process or outside of learning. Integrating these two models in science learning is hoped that it will further improve students' critical thinking skills, which is one of the challenges of 21st-century learning.

Inquiry learning is learning to find and find yourself. In this teaching and learning system, the teacher presents lesson material, not in a final form, but students are given the opportunity to seek and find it themselves by using a problem-solving approach. The inquiry learning approach is motivated by the assumption of an educator that students are subjects and objects who already have knowledge. In this approach, teachers function as supervisors, facilitators, mediators, and commentators (Palennari, 2016).

Through the integration of problem based learning with inquiry, it is expected to be able to improve students' thinking skills related to critical thinking skills.

METHODS

This research is a classroom action research using the research subjects are class VIII students in the 2021/2022 academic year at SMP Negeri 2 Rumbia, Rumbia District, Jeneponto Regency, totalling 20 students. This classroom action research aims to improve students' thinking skills related to critical thinking skills.

The instrument used in this research is a test to measure critical thinking skills. The test instrument is in the form of open-ended questions (essay form) according to the test grid. The critical thinking skills measured refer to Ennis (1985), Marzano et al. (1988), and Arnyana (2004), namely identifying and formulating problems, providing arguments, deduction, induction, evaluating, and deciding and implementing actions.

Classroom action research is a continuous improvement process of an action that contains weaknesses as a result of reflection in a better direction. For this purpose, the action has been carried out in two cycles. The first cycle consisted of two meetings and the second cycle consisted of two meetings. Each meeting uses a time allocation of 2 x 40 minutes. The implementation of learning activities in class VIII is carried out using the PBL learning model with the inquiry. Overall, teaching and learning activities were carried out during four meetings of the learning process and two meetings for evaluation. One hour lesson for 40 minutes.

Data on critical thinking skills were obtained from the results of tests conducted at the end of each cycle. Data Analysis Techniques The data obtained from the critical thinking ability test during the teaching and learning process were analyzed quantitatively with percentages.

RESULTS AND DISCUSSIONS

Based on the research results related to the critical thinking skills of class VIII students in cycle one and cycle two in the learning process using the Problem Based Learning learning model with Inquiry experienced a significant increase. More details can be seen in Table 1 below.

Table 1. Critical thinking skills of class VIII students in cycle 1 and cycle 2 who are taught using the Problem Based Learning learning model with Inquiry

Value Interval	Frequency		Percentage (%)		Category
	Cycle 1	Cycle 2	Cycle 1	Cycle 2	
85 – 100	0	11	0	55	Very high
65 – 84	6	9	30	45	Tall
55 – 64	0	0	0	0	Currently
35 – 54	14	0	70	0	Low
0 – 34	0	0	0	0	Very low

Table 1 shows that of the 20 students who took part in science learning cycle one using the Problem Based Learning learning model with Inquiry, namely: there were 0% of students obtained critical thinking skills which were in the very high category; 30% of students are categorized as high; 0% of students are categorized as moderate; 70% of students are categorized as low, and 0% of students are categorized as very low.

Meanwhile, the critical thinking skills of 20 students who took part in science learning using the Problem Based Learning learning model with Inquiry were: 45% of students were categorized as very high; 55% of students were categorized as high; 0% of students were categorized as moderate; 0% of students are categorized as low, and 0% of students are categorized as very low. The results above indicate that the critical thinking skills of students in cycle one and cycle two taught using the PBL learning model experienced a very significant increase.

The results showed that the calculation of the percentage of critical thinking skills of class VIII students in cycle one and cycle two who were taught using the Problem Based Learning learning model with Inquiry at SMP Negeri 2 Rumbia had increased. The results of cycle one show that the average student scores in the very low category with a percentage of 70%, while in cycle two, the average student

scores in the very high category with a percentage of 45%.

The results of this study also showed a significant difference in class averages in cycle one and cycle two, which were taught using the Problem Based Learning learning model with Inquiry. The average class of students in cycle one who were taught using the Problem Based Learning model with Inquiry was 50.25, and the cycle two taught using the Problem Based Learning learning model with Inquiry, increased to 87.48. If viewed individually, it can be seen that there is an increase in students' critical thinking skills from cycle one to cycle two, so in general, it can be said that the Problem Based Learning learning model with Inquiry has the skills to improve student's critical thinking skills.

The learning mastery obtained by students cannot be separated from the steps of the Problem Based Learning with an Inquiry learning model, which is the result of the integration of two learning models so that it can cover each of the weaknesses of the two learning models and is focused on being able to develop students' thinking skills. In this case, empowering students' thinking skills in solving problems related to the learning material being studied. During the learning process, students are given the freedom to study independently or in groups but are still controlled or given guidance by teachers and researchers as observers. The Problem Based Learning with Inquiry learning model is a learning model that empowers students to come up with problems, then make hypotheses and prove the problem themselves through reading activities or experiments, followed by a group of students who are experts on certain materials and will discuss with their friends who do not understand. The Problem Based Learning learning model with Inquiry can stimulate students' thinking patterns and express their thoughts through written or oral forms of discussion (Bachtiar, 2013).

Students' critical thinking skills were measured using a description test designed by the researcher. The test results show that the Problem Based Learning learning model with Inquiry is able to improve students' critical thinking skills, this is evidenced by the difference in student scores in cycle one and cycle two using the Problem Based Learning learning model with Inquiry. The results of this study are in line with Widysatuti (2010), who wrote that students' critical thinking skills are a high-level domain that can be issued or implemented when students are given the widest opportunity to do or are given the opportunity to determine problems, make hypotheses, and carry out proofs. The same thing was expressed by Agus Muliadi (2010), who wrote that Problem Based Learning with Inquiry is a learning model that is able to improve students' cognitive learning outcomes and thinking skills because this learning model teaches students to think about solutions or solutions.

The Problem Based Learning learning model with Inquiry is very well applied to all science materials because all science materials discuss life whose solutions are taken through a systematic and high-level thinking process. The Problem Based Learning learning model with Inquiry can stimulate students' mindsets and motivate students to study systematically so that students have the skills to conclude a material quickly, precisely, and more systematically. The syntax of the Problem Based Learning learning model with Inquiry directs students to learn independently but is still controlled or facilitated by the teacher so that the material studied is longer embedded in the student's brain and, of course, will have an impact on the level of analyzing students and the level of student understanding is better when compared to learning that involves students but in the context of memorizing or listening only.

CONCLUSIONS

Based on the results and discussion of this study, it can be concluded as follows. Students' critical thinking skills have increased from cycle one to cycle two, with an average pretest score of 50.25, while the post-test average value is 87.48. Problem-based learning learning model with Inquiry is effectively used to improve students' critical thinking skills. There was a significant increase in students' critical thinking skills in cycle two who were taught using the Problem Based Learning model with Inquiry.

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