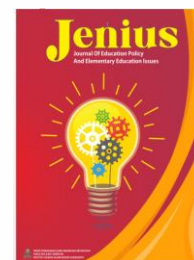




Jenius: Journal of Education Policy and Elementary Education Issues

<https://ejournal.uinsaid.ac.id/index.php/jenius>



Efforts to Improve Students' Critical Thinking Skills Through Scientific Approach in Elementary School

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ARTICLE INFO

Article History

Received: 15 February 2023

Accepted: 28 December 2023

Published: 31 December 2023

Keywords:

Critical Thinking Skills;

Educational Efforts;

Scientific approach;

ABSTRACT

This research was carried out to determine teachers' application of the scientific approach to improving the critical thinking skills of Public Islamic Elementary School 4 Sukoharjo students. The subjects of this research are class VI students for the 2022/2023 academic year. The type of research is descriptive qualitative. Techniques for collecting data are direct observation, documentation, and semi-structured interviews with teachers as research subjects and students as research informants. Based on the research results, it was found that educators in the teaching process in class VI Public Islamic Elementary School 4 Sukoharjo had implemented scientific learning in teaching and learning activities, which consisted of five activity steps, namely observing, asking, trying, reasoning, and communicating. The results obtained from applying a scientific approach to learning can make students think more critically.

INTRODUCTION

Along with the rapid progress of science and technology today, education is no exception; it must become more dynamic and developed because education is essential for extending the quality of human life. Quality is based on making people progress and have quality in their lives. It is hoped that the nation's development and progress can create a generation that thinks ahead, especially in advancing its knowledge. Therefore, the quality of education is essential for the development of a nation. The development and progress of a country are influenced by factors, namely students, learning resource media, facilities and infrastructure, and educators. Educators have an essential task in improving the quality of teaching and learning. Educators are required to develop meaningful learning, aiming to create abilities for students, especially the most essential ones, namely high-level thinking skills.

One of the higher-order thinking abilities is the ability to think critically. Critical thinking skills are a thinking process that requires high cognitive processes (Suwono et al., 2017). According to Prameswari et al. (2018), A person's ability to think critically is a primary thinking ability and is beneficial for life. Critical thinking is seen as analyzing and evaluating thoughts to improve them; in other words, independent thinking, self-discipline, self-monitoring, and self-correction (Mutakinati et al., 2018). According to Ilham & Hardiyanti (2020), critical thinking skills, namely the ability to interpret, analyze, and evaluate data based on experience that has been gained through a combination of attitudes and skills which then provide follow-up to direct individuals to think and believe in something based on the actions they have taken.

In addition, critical thinking can be described as a systematic process that allows a person to evaluate the evidence, assumptions, and logic underlying their opinions and the opinions of others to develop a deep understanding that can influence future life (Fajari, 2020b). Students with critical thinking skills can ask questions well, provide information effectively and efficiently, make rational decisions about whether something is trustworthy (objective), and arrive at consistent conclusions when solving a problem (Bustami et al., 2018). Several experts state that several things influence critical thinking abilities: physical concentration, learning concentration, intellectual development, and learning motivation (Fajari, 2020a).

Students' prior knowledge will influence their critical thinking abilities because they can develop their thought patterns according to their initial concepts (Al Hakim et al., 2018). Interaction affects critical thinking, especially during teaching and learning (Saragih & Zuhri, 2019). Learning oriented toward critical thinking skills aims to ensure that students with high critical thinking skills can achieve the competency standards set in the curriculum and design and navigate their lives in a future full of challenges, competition, and uncertainty. (Darling-Hammond et al., 2020). Efforts to help students acquire these abilities require self-awareness as part of the efforts of educators and students who explore critical thinking by utilizing teachers' teaching methods. (Puspita & Aloysius, 2019).

From the results of interviews and observations with the teacher at Public Islamic Elementary School 4 Sukoharjo, students were less able to provide answers to questions from the teacher, students tended to be slow in understanding the explanation of the material given, students were less able to work on the practice questions presented, and students were unable to provide conclusions about the material what has been studied. This condition shows that the critical thinking skills of Public Islamic Elementary School 4 Sukoharjo students are still low. This problem can be caused by the teacher's role as a facilitator not being optimal, and it could

also be that the teacher has not implemented learning methods to encourage all students to participate in learning activities. Based on these problems, learning with a scientific approach is the appropriate action to overcome students' thinking problems.

A scientific approach can improve the quality of elementary school students' learning (Rahmi, 2017; Rini & Mawardi, 2015; Syafriana, 2017). The scientific approach is a learning approach that aims to create active student learning in constructing concepts using a scientific approach process (Saeroji et al., 2018; Zaim, 2017). The scientific approach follows elementary school students' characteristics (Fitria et al., 2021). Through a scientific approach, it can increase student involvement in various kinds of learning activities, thereby enabling students to participate in observation activities, questioning activities, data collection activities, reasoning activities, and communication activities. That way, students will practice building networks.

The scientific approach is a form of learning that prioritizes direct experience, such as observation and experimentation, and pays attention to knowledge obtained from the data (Nur'ariyani et al., 2023). The scientific approach is an approach that requires students to practice as scientific experts (Lieung et al., 2019). Learning with a scientific approach is learning that consists of observing activities (identifying things you want to know), formulating questions (and formulating hypotheses), trying/collecting data (information) using various techniques, associating/analyzing/processing data (information) and drawing conclusions and communicating the results containing conclusions to obtain knowledge, skills and attitudes, these steps can be continued by creating activities.

Classroom learning can only be conditioned to fulfill these steps so that elementary school students can easily follow them. The characteristics of learning using the scientific method are that it is student-centered, involves scientific process skills in constructing concepts, laws, or principles, involves potential cognitive processes in stimulating intellectual development, especially students' high-level thinking abilities, and can develop students' character (Daryanto, 2014). The scientific approach emphasizes the active role of students in learning, while the teacher only acts as a facilitator in helping students discover and build the knowledge they have learned. Students are assigned to conclude the characteristics based on the simulation that has been carried out (De Jong & Van Joolingen, 1998). The five steps of the scientific approach are observation activities, questioning activities, trying activities, reasoning activities, and communicating activities.

Observation is an activity to obtain data/information. An object can be observed to

determine its characteristics: color, temperature, shape, weight, volume, sound, smell, and texture. In observing activities, the learning process is prioritized. This step has the advantage of presenting media objects realistically so that students will be happier and challenged to participate in learning. Scientific learning requires quite a long preparation. The observation method is useful for students in provoking their curiosity about finding facts so that the learning process has a high level of meaningfulness.

Students need to be trained in composing questions related to the studied themes because a learning process like this can stimulate students' curiosity. In the process of asking questions, questions can be given directly by teachers and students to generate student motivation. Excellent and appropriate question formulation can arouse students' interest and encourage them to learn. The hope of implementing these activities is that students can develop their creativity and abilities well so that the objectives of the competencies formed will be achieved.

The data collection activity reflects the previous activity, namely asking questions. The right way to collect data includes students reading more and paying more attention to objects and phenomena around them. Scientific learning can involve students in carrying out activities to answer the analysis of the problems they face. The teacher's role is to provide assignments and exercises to students to collect data from various references. Additionally, the teacher's role is to direct students to prepare for the experimental activities that will be carried out.

The ability to process information through reasoning activities is a relevant skill that students must master. Observations' data must be processed to find relationships between information. Inference is obtaining conclusions based on facts, data, and opinions. The step in making conclusions in scientific learning is the follow-up after data processing. The next step that needs to be taken is to find relationships between information and then draw a conclusion. Students must master the ability to create connections and communicate because these abilities are the most important. One way to form connections and communication is by working together. This skill is a basic skill in forming social networks.

The results of several previous studies show that the scientific approach influences student learning outcomes, including three main components: cognitive, affective, and psychomotor. Through a scientific approach, students can experiment in developing their work presentations. By presenting their work, students can be more creative, appreciate achievements, and cooperate reasonably with other people. Through a scientific approach, teachers can invite students to analyze and evaluate in solving a problem. Students must learn

not only to master theory but also to experiment with problem-solving, such as individual and group exercises. Through this activity, students can also provide conclusions about their understanding so that learning activities are fun and exciting. Based on these problems, this research aims to describe the process of learning activities using a scientific approach as an effort to improve the critical thinking skills of Public Islamic Elementary School 4 Sukoharjo students.

METHOD

This research was carried out at Public Islamic Elementary School 4 Sukoharjo at the address Jl. Tebon No.147, RW.2, Sawah, Bakipandeyan, Baki District, Sukoharjo Regency, Central Java. This research was carried out in the odd semester of the 2022/2023 academic year, September 12-24, 2022. The place for this research was carried out at Public Islamic Elementary School 4 Sukoharjo. The problem will be studied is the teacher's steps and strategies to encourage students' critical thinking skills through a scientific approach in teaching and learning activities. This research is descriptive research with qualitative methods. Data collection techniques in this research are observation, documentation, and interviews.

Observations are carried out by directly observing the teacher's learning process in the classroom when applying a scientific approach. Documentation is carried out by collecting lesson plans, student worksheet, or assessments in the learning process using a scientific approach. Interviews were used to obtain data from research subjects and informants regarding applying a scientific approach to learning. The interview technique used was semi-structured. Question guidelines were created and then developed independently by researchers to obtain deeper information related to applying a scientific approach in the learning process.

The subjects in this research were Public Islamic Elementary School 4 Sukoharjo teachers, while the informants were Public Islamic Elementary School 4 Sukoharjo students. Furthermore, data obtained from observation, documentation, and interviews were validated using triangulation of methods and sources. Method triangulation is carried out by comparing data obtained from observations, documentation, and interviews. Meanwhile, source triangulation was carried out by comparing data obtained from teacher and student interviews. After the data is declared valid, data analysis is carried out. The stages of data analysis were data collection, reduction and categorization, data display, and conclusion. Indicators of critical thinking abilities used in this research are basic clarification, providing reasons for a decision,

concluding (inference), further clarification (advanced clarification), conjecture, and integration (supposition and integration).

RESULTS AND DISCUSSION

The definition of a scientific approach is a learning process created with the aim that students can actively participate in creating learning concepts through several phases, including activities of observing things, activities of asking questions, activities of gathering information, reasoning activities, and reasoning activities. These phases can be broken down into several abilities, including critical thinking, communication, collaboration, and character development. Through the application of scientific learning, it is hoped that it can train students to encourage three main aspects: cognitive, affective, and psychomotor. In implementing the 2013 curriculum, a scientific approach has been implemented in teaching and learning activities. This scientific approach hopes to produce qualified graduates, and the expected learning objectives are simple, effective, and engaging. The scientific approach is a method of providing explanations to students to master the lesson material. By implementing this scientific approach, data can be obtained anywhere and anytime so that students are not fixated only on the teacher's material.

In September 2022, researchers carried out observation activities at Public Islamic Elementary School 4 Sukoharjo. In the observations made, the researcher directly observed the learning process in class VI Public Islamic Elementary School 4 Sukoharjo. It can be seen that the learning process has implemented learning with a scientific approach. This condition is characterized by the teacher carrying out the five stages of the scientific method: observation, questioning, trying, reasoning, and communicating. In the observation activity, the teacher asks students to observe the problems presented on the student worksheet. Then, the teacher asks students to create questions from the issues raised. Some students can ask questions, but others still have difficulty doing so. Therefore, the teacher uses the discussion method to design learning with a scientific approach.

Students are grouped heterogeneously, meaning that there are students with high, medium and low abilities in one group. In groups, students learn to work together to solve problems. All students are active in discussion activities. In this case, teachers also use peer tutoring to help students with low abilities solve problems well. After all groups try to solve the given problem, students are asked to reason whether the problem-solving process is correct. If

the students think the solution is correct, the teacher asks each group to present the results of their group discussion. Then, the teacher and students reflect on the learning process. The teacher also gives an evaluation test at the end of the lesson to see whether the students understand the material.

This result is also in line with the data obtained from the documentation. The lesson plan also contains all the stages of the learning process—preliminary activities containing apperception, motivation, and delivery of learning objectives. The core activities containing the stages of the scientific approach are observation activities, questioning activities, trying activities, reasoning activities, and communicating activities. The closing activity contains reflection, concluding activities, and giving a final test of the learning process.

From the interview results, the class VI teacher who was the subject of this research said that the implementation of learning using a scientific approach had been carried out for a long time. This treatment is done to improve students' critical thinking skills. Before the scientific approach was implemented, the learning process was not student-centered but still teacher-centered. Students also often receive one-way information from teachers. Students are not accustomed to developing their thinking, so their critical thinking abilities are low. After applying a scientific approach, students learn to make observations independently. Students are also required to create questions from a problem presented so that students can hone their critical thinking skills. Students must also try or carry out experiments independently to solve the problems given. Next, students are asked to reason whether the problem-solving process is correct, whether there are improvements, or whether something is still quite correct. In the final stage, students are required to present the results of their thoughts in public, and other students respond to whether the explanation from the student making the presentation is appropriate.

From the results of the triangulation method, observation, documentation, and interviews were appropriate. There is no difference in the data results obtained from the three methods. Meanwhile, the results of the source triangulation carried out between teachers and students also found no differences in the results of the data obtained from the two sources. So, the triangulation results above can be stated that the data obtained in this research is valid.

The application of this scientific approach has an impact on students' critical thinking abilities. Students can carry out basic clarification, namely being able to formulate questions at the questioning activity stage, analyze arguments at the communicating activity stage, and ask and answer questions at the asking, trying, and reasoning activity stage. Students can also provide reasons for a decision (the bases for a decision) such as assessing the credibility of

information sources and making observations and reports of observations made at the reasoning activity stage.

Students can also conclude (inference), namely making deductions and assessing deductions, making inductions and assessing inductions, and evaluating. This ability is honed at the stage of trying and reasoning activities. Students are asked to assess and evaluate whether the solutions are correct. However, students still have difficulty carrying out further clarification (advanced clarification), namely defining and assessing definitions and identifying assumptions. Students can make conjectures and carry out supposition and integration. This phenomenon shows that a scientific approach can improve students' critical thinking abilities.

The scientific approach is an approach that makes it easier for students to learn directly with natural objects. In other words, through a scientific approach, there is an increase in students' knowledge, including understanding of concepts and students' critical thinking abilities. The scientific approach is learning by collecting data through observation, experimentation, formulation, and hypothesis testing (Glazunov, 2012). In developing their thinking skills, students must investigate to determine the correct conclusion (Syarifuddin, 2018). The scientific approach is important for students because it is a form of critical thinking whose steps include observation, questioning, experimenting, making hypotheses, evaluating, analyzing, and communicating (McLelland, 2006).

Every individual needs critical thinking to deal with life's problems. Critical thinking allows students to find the truth of everyday events and information. Thus, students' critical thinking skills are how they analyze arguments, produce insight into each meaning and interpretation, and develop cohesive and logical reasoning patterns. In critical thinking, a person can organize, adjust, change, or rethink his thoughts to act more appropriately. People who have critical thinking skills are skilled at thinking. He can use a reason in the context where the reason is used as the basis of his thinking.

Someone with critical thinking will decide and reason through various views in different contexts. They will be prepared to make reasons and decisions about what they see, hear, or think. Critical thinking is the ability to analyze or examine an idea or idea after understanding the concept or idea. If thinking is part of the activities that the brain always carries out to organize information to achieve a goal, then critical thinking is part of the thinking that the brain also carries out. Critical thinking is reflective, productive, and involves evaluation or evidence.

Learning with a scientific approach can improve students' critical thinking skills because students are trained to observe, ask questions, experiment, reason, and communicate through

the stages of the scientific process. Learning through a scientific approach is a learning process designed so that students actively construct concepts through observing (identifying or finding problems), formulating problems, proposing or formulating hypotheses, collecting data using various techniques, analyzing data, drawing conclusions, and communicating concepts, as well as its principles. Students become the main subject in the scientific approach, and students can be active in learning. Opportunities are provided for students to build concepts in their knowledge independently, familiarizing them with formulating, handling, and solving problems. In this way, students can improve their understanding of certain material and have critical thinking skills. In short, a scientific approach is appropriate for improving students' critical thinking abilities.

A scientific approach is an approach that involves students actively. Using a scientific approach gives students experience in acquiring knowledge so that students will not feel bored or have difficulty with the experience. It will impress students in learning (Khuzaimah et al., 2023). The scientific approach has the potential to develop students' creativity. From research conducted by researchers, there is an increase in student learning outcomes, which shows the effectiveness of using a scientific approach in line with research conducted by Setiabudi et al. (2019), which shows that there is effectiveness in using a scientific approach in improving students' ability to understand mathematical concepts. Increasing student learning outcomes proves the success of learning carried out by teachers. The increase in student learning outcomes in this research shows that learning using a scientific approach increases students' mathematical critical thinking abilities.

Implementing a scientific approach in the learning process at the beginning of learning still has shortcomings during the implementation process. Teacher performance in managing learning has not been carried out well because the scientific approach is something new for students, so there are still many adjustments that students have to make. Students' critical thinking abilities in social science subjects then use a scientific approach. The scientific approach or scientific method generally contains a series of data collection activities through observation, questioning, experimentation, processing information or data, and then communicating. The role of teachers in guiding students in organizing assignments still needs to be improved because there are still several groups who do not understand the tasks that must be completed, so many students still directly ask the teacher before asking other group members.

Observations can occur when students conduct simulations (Rohmah et al., 2020). This

statement means that students ask questions about things they don't understand based on the results of observations to get additional sources about the material being observed. Collecting information, namely students then collect information, and this information is used to answer the questions that have been asked. This information can be obtained from various learning sources such as books, library studies, and the Internet (Anjarsari, 2019). Processing information, namely students and their groups, share the task of associating or processing information that has been obtained to answer questions that have been formulated. Students are expected to be able to communicate with other groups about various information that has been processed in their group.

CONCLUSION

Based on the overall results of the data obtained at Public Islamic Elementary School 4 Sukhoarjo, researchers can conclude that educators have implemented teaching and learning activities with a scientific approach quite well. The planning activities carried out by educators are to create learning tools such as lesson plan, student worksheet, and tests at the end of the learning process. Educators have implemented the teaching method with the 5M steps: observing, asking, trying, reasoning, and communicating. In the observation activity, the teacher asks students to observe the problems presented on the student worksheet. Then, the teacher asks students to create questions from the problems presented. Some students can ask questions, but others still have difficulty doing so.

Students are grouped heterogeneously, meaning in one group. Students learn to work together to try to solve problems together. All students are active in discussion activities. In this case, teachers also use peer tutoring to help students with low abilities to solve problems well. Students are asked to reason whether the problem-solving process is correct or not. If the students think the solution is correct, the teacher asks each group to present the results of their group discussion. Then, the teacher and students reflect on the learning process. The teacher also gives an evaluation test at the end of the lesson to see whether the students understand the material. Students experience increased critical thinking skills and increase their self-confidence, curiosity, and control of their emotions. Therefore, educators' efforts to encourage students' abilities through scientific implementation in learning is the right way because applying this method can produce quality students and make students more enthusiastic about achieving knowledge and developing their skills independently.

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