

Improvement of Science Attitude Through Scientific Approach in Environmental Science Courses

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ABSTRACT

This study aims to determine the increase in science attitude a scientific approach in environmental science courses. The method used in this research is classroom action (CAR). The subjects of this research are science students in semester 3 of the academic year 2021/2022 with a total of 24 people. This research used qualitative descriptive analysis. Based on the results of classroom action research, it can be seen that the scientific attitude of science education in environmental science courses has increased with the application of a scientific approach. The resulting difference is 5.41% between cycle I and II. Cycle I has an average percentage value of 74.61% and cycle II has an average percentage value of 80.02%. The research carried out can successfully foster scientific attitudes in students so that they are successful in learning.

KEYWORDS

Science
Attitude
Scientific
Approach

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1. Introduction

A developed nation is determined by quality resources. Human resources as actors who determine the quality of the nation, must have the ability to face challenges according to the times. These abilities are obtained from educational process. The ability of human resources is improved through education, it means that education prepared as supplies in improving the quality of nation. Education can also increase the dignity of the nation.

Human resource development is inseparable from the role of education. The government seeks to provide quality education and can realize the process of developing the quality of students following Law Number 20 of 2003 concerning the National Education System. The quality in question is in the form of processes and results in education.

According to the result of this observation in a learning process and interviews conducted by researchers at the STKIP Modern Ngawi science education study program that during the learning process it was found that scientific attitude were still lacking, it was seen during pre-cycle observations that some students' attitude of responsibility were still lacking in carrying out the learning process, students' curiosity was also still low, shown by the enthusiastic attitude of students in lectures, lecturers' explanations are ignored or not focused. Students are also less critical in the lecture process, as can be seen from the infrequent number of students who ask and respond to questions, so that is concluded that only a few meet the criteria for having a scientific attitude.

Attitude is always related to an object. A person's tendency to show an agree or disagree reaction to a stimulus is also an attitude. If the reaction is following with the characteristics of science, it is called a scientific attitude (Olasehinde, *et. al*, 2014). Applying learning which able to emerge students' scientific way of thinking is imperative to conquer these problems. The high scientific attitude of students needs to be improved so that learning can be active and innovative

If the above conditions are overcome with the right active learning, it will be able to increase the scientific attitude of students so that attitude are improved. In growing students' scientific attitude, it is necessary to carry out a lesson that leads to a scientific attitude in the learning process. One of the lessons that can improve scientific attitude is learning a scientific approach. The scientific approach is

one way to gain knowledge the procedures of the scientific method (Ratnasari, 2017). The steps of the scientific approach are observing, asking, gathering information, associating, and communicating. Scientific learning is active student-centered learning. Students play active role in cognitive activities carried out, namely understanding the subject matter, carrying out psychomotor processes, namely science process skills so that with this application they can improve the character of students, especially scientific attitude.

The scientific approach includes observable activities such as observing, asking, processing, reasoning, presenting, concluding and can be continued by creating (Wayan, 2019). The stages of these activities are systematic work steps that meet scientific criteria. this scientific approach, scientists carry out scientific work processes which prioritize inductive reasoning rather than deductive reasoning (Kemdikbud, 2015). The scientific approach is believed to be a step in fostering the development and development of knowledge, skills, and attitude of students as learners.

Scientific attitude is a character possessed by a scientist. Scientific attitude is an attitude that develops through interactions between individuals and the past and present environment. The Liang Gie suggests that scientific attitude is the attitude of a scientist in behaving or responding to something that is following with his scientific thinking and does not conflict with the image of scientists in general (Sriyono & Surajiyo, 2017). Scientific attitudes can be emerged through practicum activities which encourage students to do science activity was scientific approach such as problem based learning, inquiry (Nugroho, Wati, & Ramli, 2021; Prasetyowati, 2020; Rohmatin, Suwanto, Nugroho, & Author, 2021). Therefore, based on the description of the problem, it is necessary to increase scientific attitudes that can be developed through an appropriate approach, namely a scientific approach.

2. Method

In this reasearch used Classroom Action Research which is done in two cycles. This classroom action research uses Kurt Lewin's model, the stages are planning, action, observation and reflection(Saat & Mania, 2020). Kurt Lewin Model is used as the basic reference in action research design because he is the pioneer of action research design (Sukardi, 2021). The first is planning at this stage the researcher plans to identify problems or find the cause of a root problem. The second stage is the action taken to improve or improve as well as the changes to be achieved. The observation stage is the stage where observations are made on the course of the research that has been carried out. The next stage is reflection, which is the stage where activities occur in reviewing, seeing and considering a process that has been carried out and is associated with the results or impact of the actions that have been taken. At the reflection stage, the researcher made improvements to the initial plan that had been set. In planning or planning found a root problem in the form of a scientific attitude.

The research subjects are Science Semester 3 students for the academic year 2021/2022 with a total of 24 people. The object of research is the scientific attitude of students which consists of honesty, curiosity, responsibility, and criticality. This study uses qualitative data. The qualitative data in this study is in the form of students' scientific attitude in environmental science courses. The instruments used in this study were questionnaires, scientific attitude observation sheets, and interview guidelines related to scientific attitude.

The data analysis technique is qualitative descriptive analysis that refers to the model of Kurt Lewin consists of planning, action, observation, and reflection stage. The first is planning at this stage, researchers plan to identify problem or find the cause of a root problem. The second stage is the action taken to improve or improve as well as the changes to be achieved. The observation stage is the stage where observations are made on the course of the research that has been carried out. The next stage is reflection, which is the stage where activities occur in reviewing, seeing and considering a process that has been carried out and is associated with the results or impact of the actions that have been taken. At the reflection stage, the researcher made improvements to the initial plan that had been set. In planning or planning found a root problem in the form of a scientific attitude.

Qualitative descriptive is used to analyze the data analysis observation activities in the process of classroom action research stages. Descriptive qualitative analysis is used to describe the results of the scientific attitude obtained from the results of observations and interviews. iData analysis on scientific attitude in students is said to be successful if it is following the achievement category that has been applied. The category of achievement of scientific attitude is categorized based on (Purwanto, 2017). The success rate of the action is based on Table 1.

Table 1. Mastery Level Action Success Level

MasteryLevel Predicate success rate	Predicate
86 – 100 %	Very good
76 – 85 %	Good
60 – 75 %	Enough
55 – 59 %	Less
≤ 54 %	Poor

The indicator of success in research is if the student's scientific attitude increases with an average value of 75 with good criteria (Purwanto, 2017). This is in accordance with the assessment of the minimum completeness criterion that students get in the curriculum 2013, with a minimum score of 75, namely good attitude criteria (Kemendikbud 2014).

3. Results and Discussion

The research that was conducted was preceded by the process of collecting data related to the research sample, namely the science education students of STKIP Modern Ngawi. Based on the results of observations carried out in the learning process, students paid less attention to the lecturers during learning activities. The results also showed that some students were still less confident in asking opinions or questions. Students are less active during class discussions. When the questionnaire or exam took place, students were also less honest in their work, namely some were still looking at their friends' answers. Based on our discussion with a lecturer, it was found that student discipline was still less visible from some students who were late in submitting assignments, some were also late during learning.

Based on pre-cycle observations, data on students' scientific attitude are still lacking. The data obtained from pre-cycle observations are honest attitude with a percentage score of 65.58, curiosity attitude with a percentage score of 58.92, critical attitude with a score of 48.21, attitude of responsibility with a percentage score of 71.87, and cooperative attitude. with a percentage score of 65.62. Based on these data, the researcher intends to improve the scientific attitude of science education students in semester 3 of the academic year 2021/2022, especially in environmental science courses. Improved scientific attitude, namely curiosity, responsibility, critical attitude, honest attitude, and cooperation.

In classroom action research, the Kurt Lewin model consists of the stages of planning, action, observation, and reflection (Saat & Mania, 2020). Classroom action research conducted by educated by educators in the classroom to improving the quality of the learning process and student learning outcomes in the classroom. The stages of classroom action research carried out during the research are described in detail as follows.

The planning stage is carried out in the stages of compiling the research design, namely the preparation of instruments carried out by the learning process activities following the RPS. RPS is structured based on the steps of learning the scientific approach. In planning the RPS, it is necessary to include the stages of scientific learning by adjusting the indicators measured, namely scientific attitudes, and the RPS is equipped with an assessment technique carried out, namely observation. In this stage instrument is also formulated, namely observation sheet related to science attitude in each meeting. Preparation of the facilities and tools that will be used in the classroom such as worksheets, material displayed on the LCD, and practicum planner is designed. Planning is also carried out in recording data in the field and analyzing the data.

The action stage is the implementation stage of the planning that has been made. In practice, the lecturer carries out teaching activities following the plans that have been prepared in the RPS Learning is carried out in the classroom and outside the classroom or the surrounding environment. The learning process by carrying out learning with evidence practicals activities. Students do practicals in the field based on the groups that have been divided. The practicum carried out was environmental observations related to pollution, waste and suggested solutions for the observed actors. The process of learning with syntax according to a scientific approach. The stage of scientific learning are observing, asking questions, gathering information, associating, and communicating (Kemendikbud, 2014).

The action stage in this study was also carried out with data collection related to scientific attitude on all students. The data collection of scientific attitude was carried out the observations of 3 observers who had been given the same perception regarding the observed scientific attitude. The observations were strengthened by interviews conducted with students and lecturers.

Based on the research data, scientific learning has been carried out appropriately and systematically. It is proven from the results of the scientific observation stage obtained in the field as follows: The observing stage is carried out by students showing pictures and videos related to environmental problems. Many students have made observations the senses of sight and hearing. At the questioning stage, the lecturer poses questions to students. Students are given several problems related to video shows that must be solved by students.

The information gathering stage is where the lecturer guides students to find information and solve problems group discussions. The information obtained was sought literature studies of books, research journals and field information on the internet. Information search is also carried out by students field studies by taking observations and interviews as well as a direct with field sources. In the associating stage, the lecturer gives instructions to students to discuss the results of the problems discussed in their respective groups. The communicating stage is the stage where students submit answers to the discussions that have been generated based on the results of a literature review and evidence in the field. At this stage students present the results of their answers in class discussions accompanied by evidence obtained during field practice which is displayed the results that have been summarized. In the discussion activities there are questions and answers between students where students communicate answers according to group discussions. The observation stage is observing the results of planning and actions that have been taken. Based on the principle of observation characteristics include a joint planning between the observer and the observed. Observations focus on the resulting data. In cycle 1 and cycle 2, observations were made on the process and results of corrective actions, namely focusing on lecturer teaching behavior, student learning behavior, the interaction between lecturers and students.

The Reflection stage is carried out by researchers in reflecting on the activities that have been carried out by lecturers and students, where the results of the analysis and evaluation of activities during planning to observation are obtained. Reflection is done by looking at the observation data in the field and evaluating whether the activities carried out can improve the quality of learning, especially increasing scientific attitude in semester 3 science education students at STKIP Modern Ngawi. Reflection becomes a correction of the activities carried out in cycle 1 and cycle 2 so that existing weaknesses will be corrected in the next cycle. Reflection for cycle 1 is that some students are still busy themselves not focusing on learning so that they disturb other friends, some students are still not active in expressing opinions which are part of the critical section and, there are group members who are still confused so that they have not responded to the results of the discussion. , some students still depend on the clever group members. The results of the scientific attitude increased compared to before using the scientific approach. With the actions taken, the learning process is more interactive between lecturers and students, it can be seen from the aspect of scientific attitude indicators, which are related to student activity. The problems found in cycle one can be overcome by planning Cycle 2, namely by revising the RPS, and further clarifying the student work sheets and group divisions more than before so that students also work actively in learning so they don't depend on other friends.

Based on the results of the application of the scientific approach to the environmental science courses, Semester 3 science education students showed an increase in scientific attitude in each indicator. In the table 2 we can see the result of cycle 1.

Table.2 Results of the Percentage of Scientific Attitude Cycle 1

Scientific Attitude Indicator	Percentage (%)
Honest	68,75
Curiosity	75
Critical	67,85
Responsibility	80,2
Cooperation	81,25

Table 2 shows that students' scientific attitude has improved after applying scientific approach. The results obtained on the honest attitude with the acquisition of a percentage of 68.75. Curiosity attitude indicator with a percentage gain of 75. Critical scientific attitude indicator with a score of 67.85 percentage acquisition. Indicator of scientific attitude of responsibility with a score of 80.2 percentage gain. Indicator of scientific attitude of cooperation with a score of 81.25 percentage gain. Based on the results of the measured scientific attitude indicators, it can be seen that there are indicators that are still in the sufficient category, namely for honest and critical indicators. While the indicators of responsibility and cooperation have obtained a good category. However, the average percentage of the results of scientific attitude is still in the sufficient category, which is 74.61 in cycle 1. The results of scientific attitude have increased compared to before the treatment. Based on the results of the reflection that has been done, there are weaknesses that must be overcome so that the learning process can improve scientific attitude optimally. Therefore, it is necessary to make improvements the stages in cycle 2.

The stages of cycle 2 are the same as the stages of cycle 1 which include the stages of planning, action, observation, and reflection. The learning process also uses a scientific approach. After completing the activities in cycle 2, the data obtained from the results of scientific attitude are listed in table 3.

Table 3. Results of the Percentage of Scientific Attitude Cycle 2

Scientific Attitude Indicator	Percentage (%)
Honest	76,04
Curiosity	82,14
Critical	73,21
Responsibility	82,29
Cooperation	86,45

According to Table 3, we know that the students' scientific has increased since in the cycle 1.. This happens because students have started to get used to the learning that is applied, so they are no longer awkward in bringing up indicators of scientific attitude. Students are also more conducive in learning activities in class. The results obtained are based on the results of cycle 2 on honest attitude with the acquisition of a percentage of 76.04. The indicator of the attitude of curiosity with the acquisition of a percentage of 82.14. Indicator of critical scientific attitude with a score of 73.21 percentage acquisition. The scientific attitude indicator of responsibility with a percentage score of 82.29 The scientific attitude indicator of cooperation with a percentage score of 86.45. Based on the results of the measured scientific attitude indicators, it can be seen that the average indicators are in the good category, namely for indicators of honesty, curiosity, and cooperation. While the critical indicators have increased but are still in the sufficient category. Critical indicators are still in the sufficient category because students still do not perform well, express their ideas in front of the class, imprecise in conveying ideas especially identifying problems from associating activities. Another reason is students are still not familiar with the learning that is carried out. This is due to in the previous year

students carried out online learning. As a consequence, students got limited learning activities. The average results of the percentage of scientific attitude results are in the good category.

Based on the results of data analysis and observations on the scientific attitude of students while attending environmental science courses in cycle 2 a scientific approach, the scientific attitude has improved well. Students in the learning process have been able to carry out learning well, students also show activeness in asking questions or responding to friends which are indicators of curiosity and critical attitude. In the indicator of student responsibility, it is timely in collecting answers and assignments given by the lecturer. On the honest indicator, students are independent in answering questions in solving problems, they do not see the answers of friends. Students have also worked well with their friends, students have focused on their respective group assignments, and there is a division of tasks in presenting or communicating in class so that it can be concluded that the attitude of cooperation is good and increasing. From the percentage score of the cooperative attitude indicator from the first cycle of 81.25 to the second cycle of 86.45.

The scientific approach is very suitable in improving the scientific attitude of students because each stage of the scientific approach is able to grow the character of a scientific attitude in students. The observing stage can grow an indicator of curiosity. Curiosity is a basis in conducting research, through the observations of the students, their curiosity arises to find out the problems that are displayed through pictures and videos. A way of thinking, attitude and behaviour reflects curiosity and curiosity about everything. Curiosity also arises when questioning, associating, and communicating activities can be seen from the number of students who are enthusiastic in asking questions during group discussions and class discussions. With high curiosity, students learn to discover more (Amelia, Munawaroh, & Muchyidin, 2016). In line with Winarni's research, the stimulation displayed at the observation stage can increase the curiosity of students (Winarni, n.d.)

Indicators of honesty can appear at the stages of asking, gathering information, associating, and communicating. Students are trained to be honest in answering questions with independent answers without seeing other friends' answers. Honesty is also seen from the results of discussion assignments or independent assignments that are collected and done independently. Following with the results of the study, the most important attitude applied is honesty, in collecting data or information (Ratnasari, 2017).

Critical attitude indicators can appear, especially at the associating stage, which is related to analysis or reasoning. Students' cognitive abilities are needed broadly and critically in remembering the results of previous activities to collect information. At this stage, students carry out critical thinking activities in expressing opinions from the results of their thoughts and proving the results of group discussions. In line with the research of (Hilda Zulfi Maulidya, Aprilia, & Hanafi, 2021) they revealed that critical thinking skills emerged during the analysis process through problems presented by the lecturer. Through problems, in the process of finding a solution students must be required as a critical student.

Indicators of responsibility appear at the stage of all scientific approaches. This responsibility is related to the task or carrying out instructions from the lecturer during lectures. Independent responsibility is seen when focusing on paying attention to the lecturer's explanation, group responsibility can be seen from completing assignments by discussing with their respective groups. Responsibility is one's own obligation from an internal sense of commitment to producing a job or activity. Responsibility will generate positive motivation in learning to get satisfactory results (Kerstin Helker & Wosnitza, 2014). The indicators of cooperation appear in the stages of processing or collecting data, reasoning or associating and communicating. In scientific learning, students do not only work independently but can also work in groups, namely by working together to producing data or solve problems. Student activities are influenced by methods or approaches in carrying out learning. The stage of the scientific approach will affect student activity where these activities will have an impact on increasing knowledge and it is hoped that student learning outcomes will be optimal. In addition,

activeness is one of the attitudes that reflects a high curiosity which with a scientific approach can encourage students to explore wider inform (Winatun, 2021)

Through a scientific approach by combining theory and evidence activities through experiments, it is very appropriate to overcome the scientific attitude that is still low. This is in line with other research which states that the scientific stage will help improve scientific attitudes among science students (N & K P Meera, 2017). The scientific attitude that develops in students is needed to achieve optimal academic achievement, namely by mastering scientific insight with aspects of critical thinking, being open-minded, honest, objective, having a questioning attitude and respecting the evidence that has been found or opinions of other members (Firdaus and Darmadi, 2017)

To compare the results of the scientific attitude indicators in cycle 1 and cycle 2, it can be seen in Figure 1 and Figure 2.

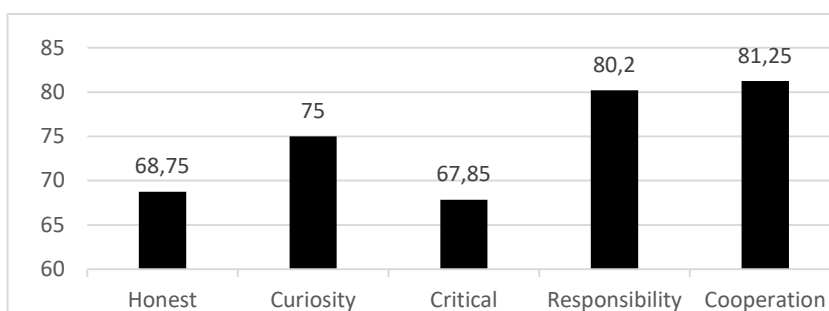


Figure 1. Results of Cycle 1 Scientific Attitude Indicators

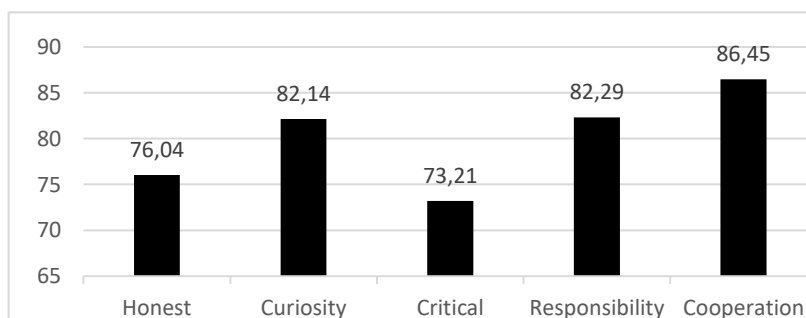


Figure 2. Results of Cycle 2 Scientific Attitude Indicators

Based on the data, cycle 1 and cycle 2 increased from an average of 74.61 to 80.02. The final result of cycle 2 was successful with a success rate of 80.2 which was applied to environmental science courses for 3rd semester science education students at STKIP Modern Ngawi. The research carried out can successfully foster scientific attitudes in students so that they are successful in learning like other research, namely the application of a scientific approach affects on scientific attitudes (Annisa, 2018). Raja also suggests that the scientific attitude that is grown will result in a positive attitude towards subjects so that students excel in these subjects. Learning must be a step in developong a scientific attitude. In this development, it is the role of the educator who is responsible for instiling the characteristics that exist in scientific attitudes (Paul & Kumari, 2020)

4. Conclusion

According to the data analysis above, it can be called that the scientific attitude of science education students in environmental science courses increases with a scientific approach. This is reinforced by the data on the assessment of students' scientific attitude in the first cycle, achieving an average percentage value of 74.61% and increasing in the second cycle with an average percentage value of 80.02%. The

research carried out can successfully foster scientific attitudes in students so that they are successful in learning.

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