Utilization of the school environment as a learning resource to improve critical thinking skills and scientific attitudes

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Abstract. This study aims to determine the effect of utilization of the school environment as a learning resource in improving critical thinking skill and scientific attitude. This study compares differences in the improvement of critical thinking skills and scientific attitudes between the agricultural and coastal environment. The research method used is quasi experiment method. This design used two experimental groups and two control groups. The experimental and control class I are the experimental and control classes located in the agricultural environment. Experimental and control class II are experiment and control class located in coastal environment. Data collection techniques in this study were conducted through tests. The conclusion of this research is the utilization of the school environment as a learning resource, both in the agricultural and coastal environments can improve critical thinking skill and scientific attitude. However, the improvement of critical thinking skill and scientific attitudes between the agricultural and coastal environment do not have a significant difference.

1. Introduction
One of the biology learning objectives is to develop analytical, inductive and deductive thinking skills by using concepts and principles of biology [1]. Biology learning carried out at this time must attention to the development of students thinking skills. The development of the times requires educational institutions not only to provide knowledge but also to equip their students to have the skills to answer the challenges of the times, among the skills that students need to have is thinking skills. Thinking skills can be classified into low-order thinking skills and higher-order thinking skills. High-order thinking skills that students need to have include critical thinking skills. Nowadays there are often unexpected changes accompanied by many problems that require solving in new ways or techniques, which are obtained from critical thoughts [2]. Meanwhile, currently teachers rarely practice learning that develops students critical thinking skills [3]. So that many humans are not powerless to solve these problems.

The concept of critical thinking is a concept that is most emphasized in the present. Beginning with the thought of John Dewey who was seen as a pioneer of modern critical thinking, Dewey called critical thinking as reflective thinking. Dewey defines as an active, persistent, and consideration of a belief or form of knowledge that is taken for granted in terms of the reasons that support it and the continued conclusions that become its tendency. Critical thinking is an academic competence that is similar to reading and writing and is almost as important. Students need to have critical thinking skills as a competence that must be mastered. Critical thinking skills can support students’ academic development.
Critical thinking has a big influence on reasoning, to express reasons and to evaluate reasoning as well as possible [4]. Critical thinking can be used to analyze arguments and bring insight to each meaning and interpretation, to develop a cohesive and logical reasoning pattern, to understand the assumptions and biases of each position. Finally, it can provide a presentation model that is trustworthy, concise and convincing. Critical thinking can be learned, estimated, and taught [5]. The standard of critical thinking skills is formulated in certain indicators. Indicators of critical thinking skills are divided into five groups adapted by Ennis, namely: elementary clarification, basic support, inferring, advanced clarification, and strategies and tactics [6].

Learning objectives listed in the syllabus of subjects in senior high school is students are expected to have competencies that include attitude competencies, knowledge competencies, and skills competencies [7]. The current development of the science curriculum does not only include dimensions of knowledge but also includes scientific attitudes. In investigating phenomena, other than products and processes. When a person practices, certain attitudes, values, and trends characterize the way they work [8]. This attitude is called a scientific attitude. Therefore, in the application of learning in schools, teachers are expected to conduct activities that can improve students’ scientific attitudes. The development of scientific attitudes is very important to develop positive attitudes in students. With the development of scientific attitudes, students are expected to have lifelong learning skills including the ability to obtain and use learning resources.

Scientific attitudes are one of the important components in biology learning [9]. A good scientific attitude can improve thinking skills, making decisions, and learning comfort [10]. Learning science can help students understand nature and its symptoms through research and investigation so as to foster students’ scientific attitudes [11]. Teachers must select, process learning materials and resources so they can achieve optimal learning outcomes to shape student attitudes [12]. Attitude as a complex phenomenon and not the result of a character, but the result of the interaction between individuals and the environment [13]. Attitudes obtained as learning outcomes, attitudes are not formed by themselves [14]. Attitude is not a form, but the result of interaction between individuals and their environment, so that attitudes are dynamic [15]. Indicators of scientific attitudes become the character of the nation that is expected to emerge from the learning of biology. These indicators by PUSKUR-Balitbang Diknas include curiosity, honesty and objectivity, openness, persistence, criticism, and cooperativeness. [1].

Environment is one of the learning resources that can be used by students. Learning must actively involve students and use the surrounding environment as a learning resource [16]. Education must not separate students from their environment and curriculum development must be based on the principle of educational relevance to their needs and living environment. The curriculum provides opportunities for students to study problems in their community as curriculum content and opportunities to apply that are learned in class in life in the community [17]. The environment is the number of all living or dead objects and all conditions that exist in the space occupied [18]. The environment is a significant determinant of student behaviour, achievement and satisfaction [19]. Utilization of environment is a strategy has proven to have a positive short-term impact on students’ attitudes and achievement [20]. The school environment is the all living and dead objects and all conditions that exist within formal education institutions that systematically carry out educational programs and help students develop their potential [21]. The school environment with all the resources around it is a great potential to be used as a means or learning resource [22]. The utilization of the school environment as a medium and learning resource is an appropriate effort in order to explore and preserve the natural environment, including the natural environment around the school. The school environment as a learning resource has several advantages, including: cost-effective, practical and easy to do and obtain, providing a real experience to students, more applicable lessons [23]. The advantages of learning by utilizing the environment include: the environment provides a variety of things students can learn, enrich insight, not be limited by class, the truth is more accurate, making learning more interesting, not boring, fostering student enthusiasm for more active learning, learning will be more meaningful because students are faced with the actual situation, student learning activities will be more increased, for example through interviews, prove something and test facts, and allow the formation of personal formation of students who are more positive, for example love the environment [24].
The natural environment is related to the social environment. Different social environments affect the way humans interact with other humans and human interaction with their environment. The social environment has several different characteristics including an agricultural and coastal environment. The characteristics of coastal society differ from the characteristics of an agricultural society. The character of coastal society assertive, hard and open. Vygotsky believes that cognitive development is influenced by a socio-cultural environment [25]. In addition, the potential of the natural environment in the agricultural area is different from the coastal area. The potential of the natural environment in agricultural areas that can be used as learning resources include: rice fields, ponds, rivers, or gardens. While the potential of the natural environment in coastal areas that can be used as learning resources include: mangroves, non-mangroves, estuaries, or fishponds.

Based on the description, the author conducts research on the utilization of the school environment as a learning resource to improve critical thinking skills and scientific attitudes. This study aims to know how the effect of the utilization of the school environment on critical thinking skills and scientific attitudes of students in the agricultural and coastal environment, and to compare differences in the improvement of critical thinking skills and scientific attitudes of students in the agricultural and coastal environment.

2. Methods
The research method that be used is a quasi-experimental method. This design uses two experimental groups and two control groups subjected to pre-test and post-test treatment, namely experimental class I and experimental class II and control class I and control class II. The experimental class I and control class I are experimental and control classes located in agricultural areas. While the experimental class II and control class II are the experimental class and the control class located in the coastal area. Two experimental classes do learn by utilizing the school environment as a learning resource with using problem-based learning models, while two control classes do learn with conventional learning methods. Respondents in this study were students of 10th grade of senior high school in agricultural and coastal areas in Pangandaran District.

The research instruments in this study include critical thinking skills test and scientific attitude test. The question of critical thinking skills tests is based on five indicators of critical thinking by Ennis [6]. The five indicators include: elementary clarification, basic support, inferring, advanced clarification, and strategies and tactics. These indicators are translated into twelve sub-indicators. The problem of testing critical thinking skills contains the concept of environmental pollution. This test is in the form of a description to measure students critical thinking skills. This test consists of 12 items that are tested first before they are used. The framework can be seen in Table 1.

| Indicator           | Sub Indicator                                                                 |
|---------------------|-------------------------------------------------------------------------------|
| Elementary clarification | Focusing on a question                                                         |
|                     | Analyzing arguments                                                           |
|                     | Asking and answering question of clarification and/or challenge                |
| Basic support       | Judging the credibility of a source                                           |
|                     | Observing and judging observation reports                                     |
| Inference           | Deducing, and judging deductions                                              |
|                     | Inducing, and judging inductions                                              |
|                     | Making and judging value judgments                                            |
| Advanced clarification | Defining terms and judging definitions                                       |
|                     | Identifying assumptions                                                      |
| Strategy and tactics | Deciding on an action                                                         |
|                     | Interacting with others                                                       |

Scientific attitude tests amount to 24 scientific attitude questions. Each question consists of four alternative answers including: Strongly Agree, Agree, Disagree and Strongly Disagree. Questions are made based on indicators that refer to the biology curriculum of PUSKUR-Balitbang Diknas which is curiosity, honesty and objectivity, openness, persistence, criticism, and cooperativeness [1].
3. Results and discussion

The result in the improvement of students critical thinking skills in the agricultural and coastal environment, and differences in the improvement of students critical thinking skills in the agricultural and coastal environment can be seen in Table 2.

Table 2. The improvement of students critical thinking skills

| Environment       | Class          | N  | Pre-test average | Post-test average | N-gain average | Category |
|-------------------|----------------|----|------------------|-------------------|----------------|----------|
| Agricultural      | Experiment     | 33 | 61.36            | 77.86             | 0.43           | Medium   |
|                   | Control        | 33 | 64.39            | 73.57             | 0.25           | Low      |
| Coastal           | Experiment     | 34 | 62.09            | 76.39             | 0.37           | Medium   |
|                   | Control        | 34 | 58.58            | 70.10             | 0.27           | Low      |

Based on the results of research that has been done, the utilization of the school environment as a learning resource can improve students critical thinking skills, both for students who are in the agricultural environment and the coastal environment. This can be seen from the improvement of students critical thinking skills that are significant in the experimental class that conduct learning by utilizing of the school environment as a learning resource compared to the control class that learning in the classroom. This happens because the students have more mastery of critical thinking skills to learn science when they have more opportunities in connecting knowledge with real-world issues [26]. In addition, the problem-based learning model in the learning syntax provides an individual/group experience to analyse problems in real life and provide opportunities for students to analyse and evaluate the problem solving made by them. The problem-based learning prepares students to think critically and analytically to find and use appropriate learning resources [27]. The learning model using society or the environment as a learning resource has enormous benefits, namely providing critical thinking skills, learning to direct student learning activities, enriching knowledge and information, improving social relations, introducing the environment, fostering attitudes and appreciation of the surrounding environment [28].

The comparison between the improvement of students critical thinking skills in the agricultural and coastal environment is not significantly different, although the gain index of students who are in an agricultural environment is greater than students in the coastal environment. Improvement gain index in the agricultural environment is 0.43 while in the coastal environment is 0.37. Improvement gain index in the agricultural and coastal environment in the medium category. The comparison students critical thinking skills in the agricultural coastal environment in each indicator can be seen in Table 3.

Table 3. The Comparison of students critical thinking skills in each indicator

| Indicator                                           | N-gain of experiment class | Average |
|-----------------------------------------------------|-----------------------------|---------|
|                                                     | Agricultural | Coastal |         |
| Focusing on a question                              | 0.54          | 0.88    | 0.71    |
| Analyzing arguments                                 | 0.30          | 0.31    | 0.31    |
| Asking and answering question of clarification and/or challenge | 0.29          | 0.11    | 0.20    |
| Judging the credibility of a source                 | 0.35          | 0.00    | 0.17    |
| Observing and judging observation reports           | 0.21          | 0.07    | 0.14    |
| Deducing, and judging deductions                    | 0.43          | 0.13    | 0.28    |
| Inducing, and judging inductions                    | 0.29          | 0.56    | 0.42    |
| Making and judging value judgments                  | 0.47          | 0.59    | 0.53    |
| Defining terms and judging definitions              | 0.11          | 0.16    | 0.13    |
| Identifying assumptions                             | 0.48          | 0.65    | 0.57    |
| Deciding on an action                               | 0.71          | 0.39    | 0.55    |
| Interacting with other                              | 0.58          | 0.33    | 0.45    |

The improvement of indicator "focusing on a question" on students in the agrarian environment and lower than students in the coastal environment. This is because the object of observation about environmental pollution in coastal environments is richer than in agrarian environments, such as garbage, fuel remnants from fishing vessels, decaying fish remnants, and waste foam that accumulates from estuary. While the object of observation in an agrarian environment includes the blooming, weeds,
domestic waste, and garbage. With the many objects of this observation students have more opportunities to explore various questions related to the surrounding environment. The improvement of indicator "analyzing arguments" on students in the agrarian environment are lower than students in the coastal environment. This is because the impact of pollution on the coastal environment is more easily observed and felt directly by students, the stench they can smell and the dead fish they can see. So that they are easier to associate between the factors that cause pollution and the effects they cause. The improvement of indicator "Asking and answering question of clarification and/or challenge" on students in the agrarian environment are higher than students in the coastal environment. This is due to the case in question, which is about the use of potassium chemicals to catch fish, students cannot observe the process directly, they can only conduct interviews with fishermen in the surrounding environment so that the learning experience gained by students is less meaningful. The improvement of indicator "judging the credibility of a source" on students in the agrarian environment are higher than students in the coastal environment. This is because students in an agrarian environment can compare data directly from agricultural institutions contained in the questions with real conditions in the field. Because the conditions presented in the question are closer to their lives. The improvement of indicator "observing and judging observation reports" on students in the agrarian environment are higher than students in the coastal environment. This is because the case given to students about the addition of detergent to water containing fish has been known in advance by most students. As a result, the value of the pre-test of students before learning is high, so that the increase is not so large. Only a few students experienced an increase in this indicator. The improvement of indicator "deducing, and judging deductions" on students in the agrarian environment are higher than students in the coastal environment. This is because in answering cases that are asked about the effect of waste disposal can cause a reduction in the number of fishes, students in the coastal environment only follow the statement on the question without further analysis of the statement. The improvement of indicator "inducing, and judging inductions" on students in the agrarian environment are lower than students in the coastal environment. This is due to the fact that students in an agrarian environment still do not understand the role of BOD and COD in the aquatic environment. Finally, they made inaccurate conclusions. The improvement of indicator "making and judging value judgments" on students in the agrarian environment are lower than students in the coastal environment. This is because students in the coastal environment come from social environments that have dependence on environmental conditions. In their lives they are accustomed to considering a decision. Because mistakes in making a decision will have a negative impact on life. The life of fishermen is very dependent on the season and environmental sustainability. If the season is bad they cannot catch fish and if the environment is damaged the number of fish will decrease. The initial capital of the social character of students in this coastal environment makes it easier for them to master the skills of making and considering the value of decisions. Whereas in agrarian societies, the available resources are more certain and visible so that they are relatively easier to predict. The nature of production which still causes the risk that might be caused is not too large. The improvement of indicator "defining terms and judging definitions" on students in the agrarian environment are lower than students in the coastal environment. This is due to lack of conducting literature studies on terms in environmental pollution material. To master the terms in this material there needs to be more literature than students. Because if you only make direct observations without being balanced by literature studies, students will find it difficult to relate facts to concepts about the terms used in environmental pollution material. The improvement of indicator "identifying assumptions" on students in the agrarian environment are lower than students in the coastal environment. This is due to cases raised in the matter closer to the lives of people in the coastal environment, which is about rotten fish waste. So their argument is more logical than the argument of students in an agrarian environment. The improvement of indicator "deciding on an action" on students in an agrarian environment are higher than students in the coastal environment. This is because students in an agrarian environment have different experiences with students who are in the coastal environment. Students in an agrarian environment experience social life that depends on their skills in cultivating nature. The community is required to be able to cultivate well. In addition, the community has free time between planting and harvesting crops, so it is normal to fill it with hand skills that can accelerate economic development. The improvement of indicator "interacting with others" on students in an agrarian environment are higher than students in the coastal environment. This is because
students who are in an agrarian environment have characteristics of the community who already know the division of labour clearly. Students in an agrarian environment are better able to determine their position and role. As a student they do not place themselves in the position of community leaders or others. So when given a case to determine strategies and tactics in an effort to overcome environmental pollution they can interact well with others, which results in more acceptable solutions.

The result in the improvement of student’s scientific attitudes in the agricultural and coastal environment, and differences in the improvement of student’s scientific attitudes in the agricultural and coastal environment can be seen in Table 4.

| Environment  | Class    | N  | Pre-test average | Post-test average | N-gain average | Category |
|--------------|----------|----|------------------|-------------------|----------------|----------|
| Agricultural | Experiment | 33  | 70.17            | 80.46             | 0.34           | Medium   |
|              | Control  | 33  | 70.45            | 77.49             | 0.23           | Low      |
| Coastal      | Experiment | 34  | 70.04            | 81.37             | 0.37           | Medium   |
|              | Control  | 34  | 70.10            | 78.71             | 0.26           | Low      |

Based on the results of research that has been done, the utilization of the school environment as a learning resource can improve students’ scientific attitudes, both for students who are in the agricultural coastal environment. This can be seen from the improvement of student’s scientific attitudes that are significant in the experimental class that conduct learning by utilizing of the school environment as a learning resource compared to the control class that learning in the classroom. This happens because the environmental utilization is a strategy that have a positive short-term impact on students’ attitudes and achievement [20]. In addition, the problem-based learning model emphasizes the process so that it can develop students’ scientific attitudes, and in the learning process can use learning resources that are appropriate to the real environment. states that attitudes reflect pleasant feelings towards an object or specific issues, therefore a person’s attitude is derived from his experience [29]. Learning with problem-based learning models that utilize the school environment as a learning resource provides a real experience for students, so that it can raise specific issues of interest to students. This interest can make students reflect their feelings, so that attitudes can be formed on the student.

The comparison between the improvement of student’s scientific attitudes in the agricultural and coastal environment is not significantly different, although the gain index of students who are in the agricultural environment is smaller than students in the coastal environment. Improvement gain index in the agricultural environment is 0.34 while in the coastal environment is 0.37. Improvement gain index in the agricultural and coastal environment in the medium category. The comparisons scientific attitude of students in the agricultural and coastal environment in each indicator can be seen in Table 5.

| Indicator            | N-gain of experiment class | Average |
|----------------------|-----------------------------|---------|
|                      | Agricultural | Coastal |         |
| Curiosity            | 0.24            | 0.29     | 0.26    |
| Honesty and objectivity | 0.16          | 0.36     | 0.26    |
| Openness             | 0.08            | 0.34     | 0.21    |
| Persistence           | 0.30            | 0.35     | 0.32    |
| Criticism            | 0.41            | 0.34     | 0.38    |
| Cooperativeness       | 0.56            | 0.48     | 0.52    |

The improvement of indicator "curiosity" on students in the agrarian environment are lower than students in the coastal environment. This is because the initial value of students in this indicator is already high. So basically, students already have a high curiosity about their environment. So that the initial value that is already high does not give a very significant effect on the end of learning. The improvement of indicator "honesty and objectivity" on students in agrarian environments are lower than students in coastal environments. This is because the causes and effects of pollution that occur in coastal environments are easier to observe. Students can observe the condition of white foam that accumulates on the beach. Students can feel for themselves the direct impact of an unpleasant odour and some animals die there. In contrast to conditions in an agrarian environment that require deeper analysis in determining
the cause of pollution so that some students are just following the opinions of others. The improvement of indicator "openness" on students in agrarian environments are lower than students in coastal environments. This is because the character of the people in the coastal environment has a strong, firm and open character. Attitudes can be learned in society and influenced by group norms. Among the characteristics of coastal communities is being open. This open attitude is the initial attitude for students to take part in learning. The improvement of indicator "persistence" on students in agrarian environments are lower than students in coastal environments. This is due to the many objects that can be examined by students in the coastal environment. So that it is more resilient in making observations. The improvement of indicator "criticism" on students in the agrarian environment are higher than students in the coastal environment. Higher critical thinking skills in students in an agrarian environment are directly proportional to the critical thinking attitudes students have. Students in an agrarian environment tend to be more careful in expressing opinions. They take more consideration before bringing up opinions in a discussion. The improvement of indicator "cooperativeness" on students in the agrarian environment is higher than students in the coastal environment. Culture of residence affects attitude. Among the social characteristics of an agrarian society are people who have settled, worked together and clearly divided the work. This attitude forms the initial attitude for students. So that group cooperation goes well.

4. Conclusion
Based on the results of research and data analysis it can be concluded that the utilization the school environment as a learning resource, both in the agricultural and coastal environment, by using problem-based learning models can improve students critical thinking skills. Students who are in the agricultural environment experience an increase in the average N-gain of 0.43 with the medium category and students who are in the coastal environment experience an increase in the average N-gain of 0.37 with the medium category. Increased critical thinking skills in students with two different environments, namely the agricultural environment and the coastal environment do not have significant differences. The utilization the school environment as a learning resource, both in the agricultural and coastal environment, by using problem-based learning models can also improve students' scientific attitudes. Students who are in the agricultural environment experience an increase in the average N-gain of 0.34 with the medium category and students who are in the coastal environment experience an increase in the average N-gain of 0.37 with the medium category. Increasing scientific attitudes in students with two different environments, namely the agricultural environment and coastal environment do not have significant differences.

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