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Guided Inquiry Learning with Outdoor Activities Setting to Improve Critical Thinking Ability and Science Process Skills of Elementary School Students

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Abstract

The research aims to analyze the effectiveness of the guided inquiry model with outdoor activities setting on the critical thinking ability and science process skills of students. This is quantitative research applying a quasi-experimental with nonequivalent control group design. The population of this study were all students of SDN Gajah 2 Demak. The subjects of this study were students of class IV A as the control group and class IV B as the experimental group. Students in the experimental group were taught using the guided inquiry model with outdoor activities setting, while the students in the control group were taught using the guided inquiry model. The instruments used to measure the success of this study were essay questions to measure students' critical thinking skills and observation sheets to measure science process skills in the psychomotor domain. The results show that the use of guided inquiry models with outdoor activities setting is effective in developing critical thinking skills and science process skills. There are differences in the average score of critical thinking skills in the experimental and the control group with a significance level of 5% with the N-gain of the experimental group is 0.35 and the control group is 0.04. Applying guided inquiry learning with outdoor activities setting is able to improve the psychomotor domain science process skills in the experimental group using the guided inquiry model with outdoor activities setting.

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INTRODUCTION

The rapid development of science and technology in the 21st century causes some challenges to the world of education. Indonesia experiences a seven-year-cycle of glory entering the golden generation. The US-Based Partnership for 21st Century Skills (P21) identifies the competencies needed in the 21st century, namely communication, collaboration, critical thinking, and creativity. In this case, the government provides human resources with excellent basic education through the 2013 curriculum. Learning through scientific approach requires students to find their knowledge through the process of observing, asking, trying, reasoning, and communicating. The expected objectives of the integrative thematic learning are that the achievement of meaningful learning (Amanaturrakhmah *et al.,* 2017). To support these characteristics, it needs learning models and learning processes that are relevant to the scientific approach.

Learning models that are in accordance with the scientific approach are problem-based learning model, project-based learning model, discovery learning model, and inquiry learning model. These learning models aim to provide students experience learning based on science. Education in the 21st century focuses on the learning that enables students to explore their curiosity, develop skills that are useful for their future lives, and work collaboratively in solving problems. Science is the basic knowledge that plays an important role in the development of science and technology. Therefore, through learning, students are expected to have skills such as creative skills, critical thinking innovation, problem solving, communication and collaboration. In line with these arguments, learning Science in Elementary Schools aims to provide students the ability and skills to think critically and solve science and environmental problems. To improve critical thinking ability and skills in the environment-based science process, the students should be directed to be creative in solving various problems of daily life through direct learning.

The results of observations in class IV SDN Gajah 2 Demak show that the teacher applied innovative and contextual models well in the learning. In interviews with the teacher, the problems faced are the students still tend to think about concepts, tend to memorize, and they have low ability to solve problems. These make them difficult to understand the materials presented by the teacher. In addition, they are less motivated and less focused on learning activities. Wahyudi *et al.,* (2013) explained that students are less motivated in the learning process in class. So, the teacher should strive to improve student learning outcomes through various learning activities that enable them to be able to develop critical thinking ability and science process skills in a learning condition that is comfortable.

According to the facts that have been revealed, it is necessary to implement a learning model that provides a stimulus for students to improve critical thinking ability and science process skills. The researcher tries to design a learning by implementing guided inquiry learning model with outdoor activities setting. Guided inquiry learning involves students in formulating questions that lead to investigations in an effort to build knowledge and maximize their abilities in finding and investigating problems systematically, logically, and confidently (Zejnilagi *et al.,* 2015).

The effectiveness of the guided inquiry learning model can be seen from the following results of research conducted by Setiawan (2018) explained that in learning not only concepts are learned, but also scientific skills and attitudes must also be possessed by teachers and students when conducting the learning process of Science in the classroom. Dahnpal and Cally (2014) explained the results of indoor and outdoor applications. Outdoor learning had an affective impact and influence on students' academic performance in understanding science. Students participated more outside the room rather than in the classroom. So, it is concluded that guided inquiry learning with outdoor activities setting is able to provide connections for students to conduct problem-based learning.

Guided Inquiry Learning Model

Selecting a learning model is very influential in the success of learning. Shoimin (2014) stated that the guided inquiry learning model is one of the models that can motivate students to be active in learning activities. In this learning, students can perform experiments, conduct discussions with peers, and solve problems in groups (Putri *et al,* 2017). The guided inquiry learning model is a student-centered learning model. According to Piaget as quoted by Mulyasa (2008), it is stated that the guided inquiry model is a model that prepares students in situations for conducting their own experiments widely so that they can see what happens, how to do something, and ask questions and find answers themselves. Kurniawan (2013) in the guided inquiry learning process, students are more active in the learning process that has been set to be able to think as an attempt to find all the concepts to initiate in solving problems, making decisions, and developing their critical thinking skills.

Guided Inquiry with Outdoor Activities Setting

This learning combines the guided inquiry model with outdoor activities implemented in the learning process in the classroom. The application of the guided inquiry model in outdoor setting activities is conducted as an attempt to facilitate the development of students' critical thinking and science process skills. Outdoor activities are applied by the researcher in solving problems in group activities of students. In outdoor learning activities, students utilize natural resources available in the school environment for the process of experimental activities outside the classroom. Fahim (2014) said that conceptualization and understanding of outdoor learning activities are obtained by students not directly from the teacher or book. They get through scientific activities such as observing, collecting, comparing, predicting, making statements, designing activities, making hypotheses, and drawing conclusions.

The implementation of the guided inquiry model with outdoor activities is expected to improve students' critical thinking ability and science process skills in the learning process. Getting used to students solving problems creatively is expected to help them overcome various difficulties related to Science.

Critical Thinking Ability

The ability to think critically is a good way that must be integrated into the learning process. The ability to think rationally and reflectively aims to make decisions about what is believed or done (Nurkholifah *et al.,* 2018). The characteristics of critical thinking ability according to Muspratiwi (2018) are (1) using facts appropriately and honestly; (2) organizing thoughts and express them clearly, logically and reasonably; (3) distinguish between conclusions based on valid logic; (4) deny irrelevant arguments, and (5) question a view and its implications.

Based on the explanation of the characteristics above, the researcher chose five indicators of critical thinking skills that are adjusted to the development of elementary school students. In measuring the critical thinking skills of elementary students, the researcher refers to Elder in Fatmawati (2014), they are (1) irreflective thoughts; (2) challenging thoughts; (3) exercising thoughts; (3) further thinking; and (4) excellent thinking.

Science Process Skills

Dimyati and Mudjiono (2009) explained that there are some skills in process skills. These skills consist of basic skills. Process skills are scientific skills involving cognitive, intellectual, and social skills needed to acquire and develop facts of concepts and principles of Sciences (Rusman, 2005). According to Nadirah (Hidayah, 2016), the science process skills aim to create an optimal, effective, and efficient learning atmosphere. The science process skills approach was chosen to replace the learning that tends to be teacher-centered. By conducting learning with this process skills approach, students can participate and be required to be maximal in following the ongoing learning process. The application of the process skills approach in learning science has turned out to give more

opportunities for students to actively participate in the learning process (Istiana, 2016). By applying the process skills approach in learning Science in elementary schools, it will increase the students' interest in learning, increase activity in the learning process in the classroom, and improve their memory during the learning.

The advantages of science process skills according to Istiana *et al.,* (2016) are as follows: (1) Science process skills can stimulate student curiosity; (2) students will be more active in learning because they have experienced the process of getting concepts; (3) a better understanding of students.

METHODS

This research is Quasi Experimental research employing nonequivalent control group design. The population of this study was all students in the Diponegoro Cluster, Gajah Subdistrict, Demak in 2018/2019 academic year. The sampling used in this study was a probability sampling technique that is sampling techniques that provide equal opportunities for each element of the population to be selected as samples. This research applied Simple Random Sampling. The samples used in this study were students of class IV A SDN Gajah 2 Demak as an experimental group and students of class IV B SDN Gajah 2 Demak as a control group. The data collection techniques used in this study were tests and non-tests. Tests were used to measure critical thinking skills using posttest questions, while non-tests were used to measure the improvement of science process skills using observation sheets. The data analysis techniques used in this study were time series analysis with 3 meetings in each class.

RESULTS AND DISCUSSION

Students' Critical Thinking Ability

Students' critical thinking skills are measured based on the results of students' answers to the posttest essay questions. These data were analyzed using t-test (independent sample t-test). Before that, the analysis of prerequisite tests were done. They were the normality and homogeneity test of students' critical thinking skills data. The results of normality test data with the Kolmogorov-Smirnov shows the significance value of 0.115 > 0.05. It is concluded that the critical thinking ability data of experimental and control students were normally distributed. The results homogeneity test show the significance value levence test at the experimental group posttest 0.186 > 0.05 and control group 0.142 > 0.05. It is concluded that the critical thinking ability of the experimental and control groups students had the same variation. The results of the t-test for students' critical thinking skills are presented in Table 1.

Table 1. Independent Sample t-test for Critical Thinking Ability

Critical thinking ability	Average score		t-test (sig. 2 tailed)	Conclusion
	Experimental group	Control group		
Post-test	87.00	80.00	0.001	different

Based on the results of the t-test on students critical thinking skills written in Table 1 it can be concluded that the students' critical thinking skills after learning in the experimental group are higher than the control group. The average critical thinking ability of the experimental group is 87.00, while the control group is 80.00. Based on the results of the t-test for students 'critical thinking skills, the significance value is 0.001. It is less than 0.05 so that it can be said that there are significant differences in students' critical thinking skills in the two groups being the subject of research.

The descriptive statistical differences in the critical thinking skills of the experimental and control groups students are presented in Table 2.

Based on the data presented in Table 2, there are descriptive statistical differences between the experimental and the control groups in the posttest. The average value of the experimental group is higher than the control group with a difference of 8.15. The highest

student scores from the two groups are in the experimental group that is 95.00, while the lowest value of the two groups is in the control groups that is 65.00. It means that the highest critical thinking ability is in the experimental group and the lowest critical thinking ability of students is in the control group.

Table 2. Comparison of Posttest Results on Critical Thinking Ability

Statistics	Experimental group	Control group
N	20	20
Mean	87.00	78.85
Minimum	73.00	65.00
Maximum	95.00	93.00

The results of this study show that students who were given guided inquiry learning outdoor setting activities possess higher critical thinking skills. Rahmawati's research (2014) entitled the improvement of the learning independence through inquiry learning based on data research shows that there is an increase in gain by 0.44 and an increase in the control group by 0.19 so that it can be concluded that project-based inquiry learning has a significant effect in increasing the learning independence.

The guided inquiry learning model with outdoor activities setting has different characteristic with guided inquiry model. The difference is caused by the differences in syntax of the model applied. So, students who receive a guided inquiry learning model with outdoor activities are able to think critically through practical learning. Learning critical thinking is not about what is learned, but it is about how we accept, investigate, guide, and decide everything based on existing aspects (Syafitri *et al.,* 2016).

Science Process Skills

Data on science process skills were obtained during treatments using guided inquiry learning models in the experimental and the control group. These data were taken by using observations. The indicators of science process skills were assessed. There are 5 indicators with the same assessment for each group. Results of the data description of the science process skills possessed by 40 experimental and control group students.

The results of observation of the science process skills of the experimental group are presented in Figure 1.

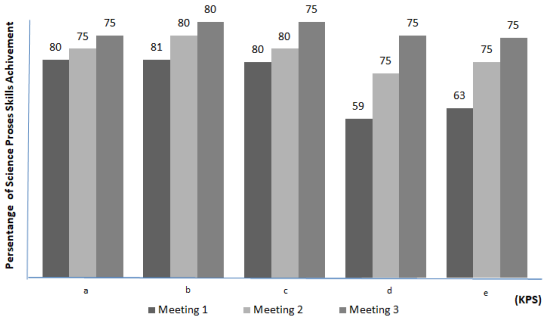

Figure 1. The Improvement of the Science Process Skills of Experimental Group

Information:
(a) observing; (b) classifying; (c) predicting;
(d) concluding; (e) communicating

Based on Figure 1 above, the science process skills in the experimental group show that students experience an increase in science process skills at each meeting.

The observation results of the science process skills in the control group are presented in Figure 2.

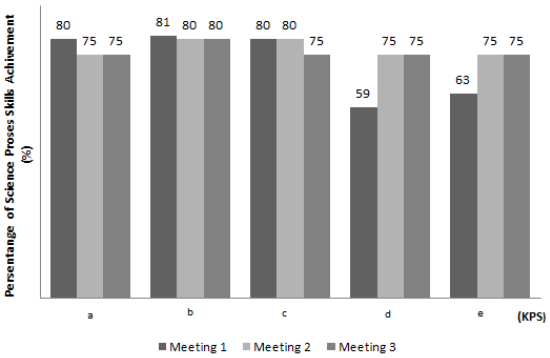

Figure 2. The Improvement of the Science Process Skills of Control Group

Information:
(a) observing; (b) classifying; (c) predicting;
(d) concluding; 9e) communicating

Based on Figure 2, it can be seen that skills in the control group increase and decrease. It shows the instability of students' abilities. Based on the data improvement of science process skills in the experimental and the control group, it shows that the average value of each indicator is dominated by the experimental group. The

percentage obtained in the experimental group using the guided inquiry model with outdoor activities increases significantly at each meeting. From those tables, it can be concluded that learning using the guided inquiry model with outdoor activities is better than conventional learning.

The guided inquiry learning model with outdoor activities is a fun learning model for students. They tend to feel curious following the environment-based learning process with activities outside the classroom because this model can familiarize students actively and creatively in dealing with problems. They will deal with and solve problems skillfully to stimulate their critical thinking ability in various activities.

The results of this study show that the guided inquiry learning model with outdoor activities has an influence both on the ability to think critically and the science process skills. The advantages of the guided inquiry model with outdoor activities setting have a positive influence on students either individually or in groups. Individually, a positive influence is formed in the form of responsibility in solving problems given in the learning process, while a positive influence formed in the group is the ability of students to communicate their ideas and thoughts to members of the group and other groups through the presentation of the discussion results.

The advantages of outdoor activities according to Osama *et al.,* (2015) are (1) learning feels good; (2) varied, real, and broad learning; (3) students are more familiar with the real and broad world; (4) embedded in the children's mind that the environment can be as a class for learning; and (5) the brain works more relaxed.

Based on the explanation above, it can be concluded that the advantages of the guided inquiry model with outdoor activities are students are more active in the learning process because they find out their own knowledge based on their experiences, train them to think critically in solving problems, learning is more interesting because it is not tied to the class, interaction between students is much more because almost all activities are based on problem solving and discussed with the group, and they are able to apply the knowledge they have into real situations.

CONCLUSION

Based on the research conducted at SDN Gajah 2 Demak, it is obtained t-test which shows that there are differences in students' critical thinking skills in the experimental and the control group. The experimental group was taught using guided inquiry outdoor setting activities and the control group was taught by the guided inquiry model. The results shows that the inquiry model with outdoor activities is effective in developing critical thinking skills and science process skills. There are differences in the average score of critical thinking skills in the experimental and the control groups with a significance level of 5% with N-gain in the experimental group is 0.35 and the control group is 0.04. The data obtained on the psychomotor domain science process skills in the experimental group increases at each meeting and the control group is changeable in the scores at each meeting. So, it can be concluded that guided inquiry learning with outdoor activities setting is more effective in developing critical thinking ability and science process skills of elementary school students. A suggestion for other researchers is that to be able to continue this research by examining other dependent variables.

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