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The Effectiveness Of Outdoor Learning On Concept Mastery And Science Process Skills In Science Subject Of Students In Class VIII SMP Negeri Sumber Rejo

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ABSTRACT

This study aims to improve students' mastery of concepts and skills using outdoor learning-based science learning. This study used a quasi-experiment (pseudo-design) method with a randomized control group pretest-posttest design. The population of this study was the 8th-grade students of SMP Negeri Sumber Rejo. The research subjects were students of class VIIIA as the experimental class and students of class VIIIC as the control class. Research samples were selected through a simple random sampling method. Research data were obtained through test instruments and non-test instruments. Data analysis techniques used percentages for science process skills and t-tests for concept understanding. Hypothesis testing with a t-test using the SPSS program obtained a Sig value 0.000 <0.05, then Ha is accepted and Ho is rejected, which means that outdoor learning-based science learning is effective to improve students' concept understanding and science process skills. Based on the observation of students' science process skills at the first meeting in the experimental class was 79.7% while in the control class was 64.6%. The average value of the observation of science process skills at the second meeting in the experimental class was 84.8% while in the control class was 74.6%.

Introduction

The 21st century is marked as an era of openness and globalization, where developments in the fields of science, technology, and information are developing rapidly. These developments require humans to have the ability to take advantage of scientific and technology advances. The progress of science and technology in the era of globalization has entered various aspects of life, including the field of education. In this century, various levels of education will be followed by explosions of digital technology and information and impact the growth of the millennial generation with one of its characteristics, namely proximity to the digital word (Afandi et al., 2019).

Digital technologies continue to influence teaching and learning (Feerrar, 2019). Innovative learning of the 21st century creates human resources to be literate in information, data, and technology which are urgently needed to face life competition and the job market in the current and future era of globalization(Priyanti et al., 2020). Learners need to be equipped with 21st-century skills/abilities (Yuni et al., 2016). 21st-century competencies consist of four main domains namely digital era literacy, inventive thinking, effective communication, and high productivity(Rahayu, 2017; Turiman et al., 2012; van Laar et al., 2017).

Digital literacy is the ability to understand, analyze, assess, organize and evaluate information using digital technology (Mohammadyari & Singh, 2015). Digitally literate individuals are those who can search efficiently, compare sources, and sort authoritative from non-authoritative, and relevant from irrelevant, documents with software, or perform basic information retrieval tasks(Buckingham, 2006). Having digital literacy requires more than the ability to use software or operate digital devices; it covers a wide range of complex skills such as cognitive, motor, sociological and emotional skills that users need to master to use digital environments effectively (Eshet, 2012). Students need to assess the credibility of information and determine the level of trust they find online, therefore a digital literacy-oriented learning approach is needed by Joel Breakstone.

Apart from digital literacy, scientific literacy is one of the skills needed in the digital era (Turiman et al., n.d.). Scientific literacy can be interpreted as scientific knowledge and skills to be able to identify questions, acquire new knowledge, explain scientific phenomena, draw conclusions based on facts, understand the characteristics of science, awareness of how science and technology shape the natural, intellectual and cultural environment, and a willingness to be involved. and care about issues related to science (Kemendikbud, 2021). Scientific literacy describes an individual's ability to understand laws, theories, scientific phenomena, and things (Dragoş & Mih, 2015). Mohammadyari & Singh (2015) ,classifies the definition of scientific literacy into two views, which are very concerned with scientific knowledge and appreciate the usefulness of science in a social context. In learning biology, scientific literacy must be applied to improve students' cognitive abilities (Alfionora & Hasnah Putri, 2021).

In fact, the ability to digital literacy and scientific literacy of students in Indonesia is still low. Digital literacy in Indonesia has not yet reached a “good” level based on the Information & Data Literacy Sub-index, with the lowest score (Aptika, 2020). Furthermore, the results of the PISA studies related to scientific literacy in 2015 and 2018 show that Indonesia's average scientific literacy score is below the international average score. The low scores of Indonesian students reflect the low achievement in learning science (Huryah et al., 2017).

Biology is a branch of science that needs to be considered in terms of digital literacy and scientific literacy. Several studies on biology learning related to the analysis of digital literacy skills and science have been carried out. Research related to digital literacy conducted by (Amboni et al., 2021) shows that the digital literacy of class X students of SMAN 3 Batu Ampar in biology learning is classified as a moderate level. Furthermore, research conducted by Fadilah et al., (2020) and Huryah et al., (2017) shows that students' literacy skills are categorized as low. Therefore, digital literacy and learning science literacy in Indonesia need to be improved by conducting deeper investigations through research.

One of the researches that needs to be done first is literature study research with bibliometric analysis. Bibliometric analysis has been widely used to analyze research trends (sources). Therefore, this study aims to analyze research trends related to digital literacy and scientific literacy in biology learning in Indonesia and to find future research opportunities.

Method

This type of research is a quasi experimental research. The design used in this research is a randomized control group pretest-posttest design. The instrument used to measure students' mastery of concepts in science learning is done using tests. Arikunto (2016: 193) states that a test is a series of questions or exercises and other tools used to measure skills, intelligence knowledge, abilities or talents possessed by individuals or groups. The test in this study was in the form of a multiple choice test totaling 30 questions. Then to measure science process skills using observation sheet instruments. The observation sheet is a tool used to measure students' science process skills during the learning process. The making of this observation sheet is based on indicators in achieving the criteria for students' science process skills, namely observing, classifying, predicting, measuring, concluding and communicating. The data analysis techniques used in this study were normality test using Kolmogorov- Smirnov, homogeneity test using Levene Statistic and hypothesis testing using Independent Samples t-test

Results and Discussion

These results are the main data and were obtained through observations of science process skills conducted by three observers during the learning process. Before the observation was carried out, the observers were given technical guidelines for observation and how to fill in the observation sheet that would be used. The observation process is in such a way that it does not interfere with the ongoing learning process. The results of the data analysis of the student science process skills observation sheet are presented in table 1 below:

Table 1 Description of Science Process Skills Data

No.	Aspects of science process skills	Average	
		Control Class	Test Class
1	Observing	72.1%	78.2%
2	Categorize	70.3%	81.2 %
3	Forecasting	63.7 %	78.6 %
4	Measuring	69.6 %	81.5 %
5	Communicate	70,7 %	86.8 %
6	Summarize	71.5%	87.3 %
Average		69.6 %	82.3 %

Based on the results obtained from observers related to the learning implementation of experimental and control classes, different results were obtained from each group. At the first meeting, the experimental group still obtained a higher score than the control class because in the implementation of learning in the core activities, the teacher still had not guided students to carry out experimental activities for each group, then the teacher also had not allowed grouping representatives to make presentations, but in the implementation of the second meeting of learning the results of learning implementation had increased compared to the first meeting, in the core activities the experimental class obtained a percentage of 80% and the control class only obtained 60%. This is because at the second meeting, the teacher did not guide each group to discuss making reports in the experimental class, while for the control class, the teacher allows grouping representatives to make presentations and the teacher also does not divide students into groups in learning activities.

Based on the results of observations by observers, the average value of students' process skills at the first meeting in the experimental class was 79.7% while in the control class was 64.6%. The average value of the observation of science process skills at the second meeting in the experimental class was 84.8% while in the control class, it was 74.6%. This shows that the results of observations of students' process skills for two meetings show that the average results of observations of students' process skills in the experimental class are greater than the control class both at the first and second meetings. This happens because using outdoor learning facilitates students to find information from anywhere, not depending on the teacher.

In observing activities, students use their senses and also their minds. Furthermore, students will ask questions about what they do not understand, what to look for, how to look for it, what alternatives can be made, and how to do it. Students apply alternative ways of solving while gathering as much and as selective information as possible. After gathering information by applying solution strategies or experiments, students reason (seek conclusions) or associate results to form one or more conclusions. Students are also facilitated to communicate the results by discussing or reporting, both with other students and with the teacher so that the information received by students does not only depend on information from the teacher. This is explained in the research of Mundilarto and Pamulasari (2017) outdoor learning-based learning is intended to provide students with an understanding in recognizing, and understanding various materials using a scientific approach, that information can come from anywhere, anytime, not depending on unidirectional information from the teacher.

Providing direct experience when learning using learning by using the surrounding nature, the teacher has provided opportunities for students to train and use science process skills. All activities in outdoor learning stimulate students to actively search for themselves while the teacher is only a facilitator so that students are required to use many science process skills. As stated by Mundilarto (2017) in learning with outdoor learning, the teacher acts as a resource person or facilitator, organizes or directs learning activities, provides feedback, provides explanations, and so on.

In this study, the method applied is the experimental method because this method is one of the student-centered learning methods, in accordance with the nature of the scientific approach itself, namely a student-centered learning approach or active learning. This is based on the opinion of Hastuti and Hidayati (2018), in science learning, the experimental method is one of the learning methods centered on students to carry out an experimental process either in groups or individually to understand science concepts. Through the experimental method, students can carry out observation activities, design tools and materials as well as communicate the results of experiments. In the average results of observations in each meeting, there was an increase in science process skills scores between the first and second meetings. The lowest student process skills score based on observation results is the score at the first meeting and the highest score is at the second meeting. This is because students at the first meeting are not used to implementing student-centered learning. Then the second meeting increased because the experiment at the second meeting was more interesting than the experiment at the first meeting.

Statistical data on pretest and posttest results obtained by students in the experimental group and control group in this study are presented in Table 2 below.

Table 2. Statistical Data of Pretest and Posttest Results

Data	Experiment Class		Control Class	
	Pretest	Posttest	Pretest	Posttest
Maximum Value	65	95	70	80
Minimum Value	25	65	15	40
Mean	50,31	79,06	50,76	65,76
Median	50,00	80	55,00	65,00
Mode	50	80	50	65
Standard Deviation (SD)	11,635	7,666	13,117	9,447

Based on table 2 above, it can be seen that the average pretest score for the experimental class is 50.31 and 50.76 for the control class. This shows that the average value of the control class is higher than the experimental class. From the results of giving the pretest, the average value of the two classes is almost equal so it can be concluded that the

two classes have the same understanding. The maximum value for the experimental group of 65 is lower than the maximum value of the control group which can reach 70. However, for the minimum value of the experimental group, 25 is higher than the control group which only has a value of 15. In addition, the standard deviation of the control group of 13.117 is higher than the experimental group of 11.635. This means that the diversity of the control group values is higher than the experimental group values. Judging from the mode value, the experimental class and control class got the same value of 50. While judging from the median value (middle value) the experimental class was lower than the control class which was 50.00 for the experimental class and 55.00 for the control class.

After providing learning to the experimental class using outdor learning-based learning, it can be seen for the experimental class the average value of the post-test is 79.06 while the control group is 65.76, from the data on the results of giving the post-tests, the average value of the two classes is very different where the value of the experimental class is higher. In addition, the maximum and minimum values in both groups have increased compared to the pretest, the maximum value for the experimental group of 95 is higher than the control group which is only 80, while the minimum value of the experimental group is 65 while the control group is 40. The standard deviation of the control group is higher at 9.447 while the experimental group is 7.666. This means that the diversity of the control group values is higher than the experimental group values. Judging from the mode value, the experimental class was greater at 80 and the control class scored 65. In terms of mode value and median value (middle value), the experimental class and control class got the same value, namely 80 for the experimental class and 65 for the control class.

Hypothesis testing in this study uses t-test calculations which are carried out after the data is assessed and declared normally distributed and homogeneous (for pretest data). This hypothesis testing was carried out to determine the difference between the two means (experimental class and control class posttest results). In this T-Test data test, researchers used the help of the SPSS 24 program, namely Independent Samples. The following is a table of hypothesis test calculation results based on the average difference in posttest mastery of concepts between experimental classes that were given treatment using outdoor learning-based learning and control classes that were not given treatment or used conventional learning applications in their learning.

From the data analysis obtained, in the pretest results it can be seen that the lowest score obtained by the control group was 25 and the experimental group was 15. While the highest score obtained in the control group was 65 and the experimental group was 70, this shows that the level of student ability in both groups is almost equal. The average pretest score in the control group was higher than the experimental group. This means that more students in the control group obtained scores close to the highest score than the experimental group. This may be due to students in the control group being more thorough in answering the pretest questions.

After the research was conducted, it was found that the learning outcomes of students who used outdoor learning activities were higher than those who used conventional learning with a significant difference, which can be seen from the post-test scores obtained by both groups, the highest score obtained in the control class was 80 while the experimental group was 95. The average value of the two groups was different, the experimental group had a higher average value than the control group. The average value obtained by the experimental group was 79.06, while the control group obtained an average value of 65.76.

Based on the results obtained during the study, it can be seen that the learning outcomes of class VIIIA as an experimental group using outdoor learning-based learning are better than class VIIIB as a control group using the conventional model commonly used by teachers. The data that shows this is the acquisition of values with an average pretest value of 50.76 for class VIIIB and 50.31 for class VIIIA, with a difference of 0.45. Then the difference increases in the average post-test value of 13.3. Based on the results of hypothesis testing, it is stated that physics learning using outdoor learning is effective for students' concept mastery. After conducting the normality test and homogeneity test, it is known that both classes are normally distributed and homogeneous, therefore hypothesis testing uses a t-test. The t-test conducted aims to determine the effect of outdoor learning on students' concept mastery. The t-test was conducted by comparing the post-test in each class.

The results of the t-test analysis of science learning using outdoor learning can improve the mastery of concepts of students in class VIII SMP Negeri Sumber Rejo. This is in accordance with the calculation of the SPSS program which uses the t-test analysis for samples derived from different distributions Independent samples test. The results of the data calculation show that the Sig value = 0.000 <0.05. In accordance with the test criteria, if the significance value in the Sig column. (2-talled) > 0.05, then Ho is accepted. If the significance value in the Sig. (2-talled)/2 < 0.05, then Ho is rejected. Thus, the value obtained is 0.000 or <0.05, then Ha is accepted and Ho is rejected. So it can be concluded that science learning using outdoor learning is effective to improve the mastery of concepts of students in class VIII SMP Negeri Sumber Rejo. This is in accordance with the theory that the learning process using the outdoor learning approach is intended to provide understanding to students in recognizing, and understanding sharing material, that information can come from anywhere, anytime, not depending on the teacher's unidirectional information. Based on this theory, it can also be interpreted that learning is directed to encourage students to find out from various sources not only from the teacher in order to stimulate students to be active in learning activities so that students understand the material more easily.

Conclusion

Science learning using outdoor learning is effective in improving the mastery of concepts and science process skills of 8th-grade students of Air Satan State Junior High School. This can be proven from the results of data analysis which shows that the average posttest value of concept mastery in the experimental class is 79.06 so Ha is accepted. Science process skills also increased significantly in the experimental class, with an average observation of 84.8% in the second meeting, while the control class only reached 74.6%.

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