Jurnal Pendidikan Sains (JPS). Vol. 9(2) pp 193-200 ISSN:2339-0786
DOI: https://doi.org/10.26714/jps.9.2.2021.193-200

JPS JOURNAL PENDIDIKAN SAINS
JURNAL PENDIDIKAN SAINS
p-ISSN : 2339-0786 o-ISSN : 2502-1443
UNIVERSITAS MUHAMMADIYAH SEMARANG

Improving Science Process Skills and Concept Understanding through Field Study of Class VII.1 Student

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Article history
Submission : 2021-10-05
Revised : 2021-10-24
Accepted : 2021-11-13

Keyword
Science Process Skills
Concept Understanding
Student Field Studies

Abstract

This study aims: (1). Improve students' KPS (Science Process Skills) abilities through Field Study learning. (2). Improve students' conceptual understanding skills through field study learning. This study uses *Classroom Action Research*. The research activity was carried out in the classroom to study and critically reflect on a lesson plan on teacher performance, teacher-student interactions, and student-class interactions. The aggregate of students who became the object of this study was 24 students. The results in this study were an increase in the number of students who reached the target cycle I to cycle II. The results in cycle II have reached the target set; this shows that the application of school-based learning can improve students' conceptual understanding. This achievement percentage shows that students have experienced increased skills in observing, classifying, predicting, measuring, communicating, and concluding. This achievement shows that students have experienced increased understanding in translating, interpreting, and extrapolating. The percentage increase in the achievement of each indicator, namely, translating 13.1%, interpreting 14.4%, and extrapolating 13%. The conclusions in this study are (1). The percentage of improvement in science process skills using field studies of class VII.1 students on the subject of substance was 11.05%. (2). The use of field studies can improve the conceptual understanding of class VII.1 students on the subject of substance by 13.7%.

1. INTRODUCTION

Learning as a process is a system that involves various components, including components of teachers, students, materials, learning resources, learning media, methods, and so on, which complement each other between components. The success of learning is very much determined when the learning can change students. This changes in the sense of developing and developing students' potentials so that students can get direct benefits in their personal development. The responsibility for the success of this learning rests with an educator.

Learning is the result of learning events characterized by student involvement in these learning activities. Learning activities are not only carried out in class, listening to teacher explanations and receiving information. However, learning activities can also be done outside the classroom, such as in a school environment, by learning everything and gathering new information in everyday life.

In order to create physics learning, as mentioned above, an environment and learning media are needed that support the creation of creative physics lessons Because based on the opinion of Gagne and Briggs (Krisparinama et al., 2020). implicitly says that the learning media includes tools that are physically used to convey the contents of the learning material. In other words, media is a component of learning resources or physical vehicles that contain instructional material in the student environment that can stimulate students to learn. It is hoped that school-based learning will be created that supports science process skills and students' understanding of concepts. There is a significant difference in understanding physics concepts in the experimental class compared to the control class. Science process skills that can be accessed through field trip activities are essential, processing skills and investigative skills (Ubaidillah, 2018).

Physics subjects are included in the science class, which require investigative activities as part of scientific work that involves scientific process skills based on a scientific attitude. In addition, physics learning develops curiosity through discoveries based on direct experience made through scientific work to use facts and build concepts, principles, theories, and laws. Process skills in physics include the skills of observing/observing, classifying, predicting/ predicting, interpreting, compiling hypotheses, carrying out investigations/experiments for data collection, presenting the results of investigations/ experiments in tables/graphs, as well as discussing, concluding, and communicating in writing and oral.

The increase in students' science process skills (KPS) shows that contextual learning can be suitable for improving science process skills. The increasing KPS is because the essence of contextual learning leads students to build their knowledge through active involvement in the learning process (Harti et al., 2018). One effort that can be applied is to apply science education that links technology and society so that concepts in science education, especially chemistry, are easier to understand (NINGSIH & SUARDANA, 2015).

Based on the pre-survey results, it was found that the learning process at SMP LKMD Sekampung is one of the private secondary schools located in the countryside, precisely in Girikarto Village Sekampung District, East Lampung Regency. Based on preliminary observations, SMP LKMD Sekampung only has one laboratory room (computer lab), while the science lab does not exist. Even though six classes need this room to develop student's skills and understanding, limited facilities are still hampered, especially rooms and practicum equipment. Therefore, the researchers chose the field study method as an alternative to overcome this problem.

The school environment can be used as a learning tool/material, learning media, and a concrete learning resource. Field study is a learning activity in the form of observation that links subject matter with the real world, namely natural facts around students, preceded by the intervention (intervention) from the observer. This intervention is intended so that the phenomenon desired by the observer can be seen and observed. It is hoped that students will be more interested in learning the material form of matter through natural objects directly than through papers, books, or blackboards. Thus, it is hoped that students' science process skills and conceptual understanding can be improved through field studies.

2. METHOD

This research uses Classroom Action Research. The term in English is *Classroom Action Research*, a research activity carried out in the classroom to examine and critically reflect on a lesson plan on teacher performance, teacher-student interactions, and student-class interactions. "Action research is action *Classroomresearch*, which is research conducted by classroom teachers or with an emphasis in the school where they teach with an emphasis on perfecting or enhancing the learning process and praxis" (Arikunto, 2006, p.1). This class action research plan has been implemented at SMP LKMD Sekampung in class VII.1 of the Integrated Science subject for the 2020/2021 academic year. Learning in this study was carried out in several cycles, where each cycle consisted of 2 meetings. Execution in action is carried out in 4 stages: planning, implementation, observation, and reflection. The research site was conducted at SMP LKMD Sekampung. Research time was carried out from August to November 2020/2021. The subjects of this study were students of class VII.1 Odd Semester of 2020/2021 Academic Year.

The instruments in this study were (1). This study used observation sheets to obtain data on science process skills during the learning process using the field study learning method. The collecting data is through observation sheets when observing science process skills (KPS) for students. Practical observation sheets are used to measure PPP. (Wiwin & Kustijono, 2018). The observation sheet contained

in the appendix contains science process skills and indicators that will be observed. The observation sheet is filled out by giving numbers 1, 2, and 3 with the respective criteria listed in the science process skills indicator. It is according to the quality of the skills performed by the students, and filling out the observation sheet is done by the *observer*, and one *observer* observes 1 group. (2). Test Questions will be given at the end of the cycle to determine the conceptual understanding skills of students after participating in learning. The results of calculations using the Gregory formula of 11 items indicate that the instrument is categorized as valid with a CV of 0.73. Based on the calculation results, obtained r_{11} = 0.91. Its means that the ability test instrument is reliable because the obtained $r_{11\ is}$ more than 0.70. (3). Observers carried out observers who used field notes in this study regarding implementing learning activities in each cycle, which were used to reflect on activities in the next cycle. (4). Documentation The documentation carried out in this study is a documentation of learning activities using the field study method. Documentation, in this case, includes the syllabus, lesson plan (RPP), worksheets that apply the field study method, and documentation in the form of photographs during learning activities.

To obtain data originating from the field, researchers use good instruments and can retrieve information from the subject under study. The research instrument has two essential requirements, namely validity and reliability. (Arikunto, 2010) states that "validity is a measure that shows the levels of validity or validity of an instrument. An instrument is said to be valid if it can reveal data from the variables under study appropriately ". (Arikunto, 2010) states that "An instrument is reliable enough to be used as a means of collecting data because the instrument is good." So, the instrument reliability test is carried out to know the instrument's consistency as a measuring tool so that the results of a measurement can be trusted. A reliable instrument will produce reliable data. If the data is indeed accurate, then the number of times taken will remain the same.

The instrument that has been made has been tested on respondents, namely students of class VII—1 SMP LKMD Sekampung who have received the previous lesson material. The results of the instrument trial have been tested for their stability by testing their reliability. The technique of collecting data in this classroom action research is through observation and test methods. Observation is defined as recording and observing the symptoms that occur in direct learning activities. Student observation sheets in this study were used to obtain data on students' science process skills during the learning process. As for data collection, it was carried out by the observer in each cycle. Test questions will be given at the beginning and end of the cycle to determine the conceptual understanding students have after participating in the lesson.

The data analysis techniques in this study were (1) data of analysis science process skills. The research data is in the form of qualitative data from process skills in each cycle. Following the nature of this research, namely classroom action research, the data analysis used in the study is descriptive analysis, which attempts to describe or review the data obtained. Before determining the research predicate, first determine the criteria (benchmarks) that will be used as a benchmark for the following assessment, if using an assessment of 3 categories, good, adequate, and lacking, according to the grouping of scores. The score ranges are divided by three equally. (2). Student Concept Understanding Data Analysis determines the increase in student's conceptual understanding using field study methods.

3. RESULTS AND DISCUSSION

The learning strategy used was the field study method, students were divided into several groups, and the teacher was only a facilitator. This learning is designed to improve science process skills and students' understanding of concepts in the learning process. The stages in learning are planning, acting, observing, and reflecting.

Understanding of the concept is obtained through tests and science process skills during learning activities using observation sheets. This research was conducted at SMP LKMD Sekampung Academic Year 2020/2021 in class VII.1. Learning in the first cycle was carried out in 2 meetings for learners or observations, one meeting for evaluation and reflection, and material conclusions or affirmation of learning, with a time allocation of 2 x 40 minutes per meeting.

The second research meeting was conducted with the material particle arrangement of substances with a learning time allocation of 2 lessons (2 x 40 minutes). Two students did not attend, namely in group 1 and group 4 so that the number of attendance was 24 students.

In this observation activity, the researcher was assisted by five observers from one batch of students. Each of them had a role in observing the science process skills of 1 group of students. To equalize perceptions, the researcher and all observers were *volunteered* before making observations in the field. Additionally, at each end of the meeting, as an observer, conduct a field do also *briefing* to see the observer's findings and ask for suggestions for improvement in the next cycle.

Based on the research results described, an overview of how the field study learning process can improve science process skills and students' conceptual understanding of the subject matter of the substance is obtained. The details of the observations on the research that have been carried out are as follows:

1. Science Process Skills

Based on the observations made by researchers and observers, students' science process skills observed at the first and second meetings in observation activities have increased from cycle I to cycle. II. The increase in science process skills is a picture that shows that learning has been carried out well. In the learning process, all activities carried out by students are directed to seek and find their answers to a question, which is expected to improve science process skills (Sanjaya, 2012).

Based on the research results, we can see that the six indicators of science process skills have increased the percentage of achievement. It means that observing skills' achievement has increased by 8.2% from cycle I to cycle II. Achievement in each indicator, namely: classification skills 6.9%, communication skills 14.1%, measuring skills 8.9%, prediction skills 16%, skills concluding 12.5%. The improvement of each achievement indicator of basic science process skills is also presented in diagram 1.

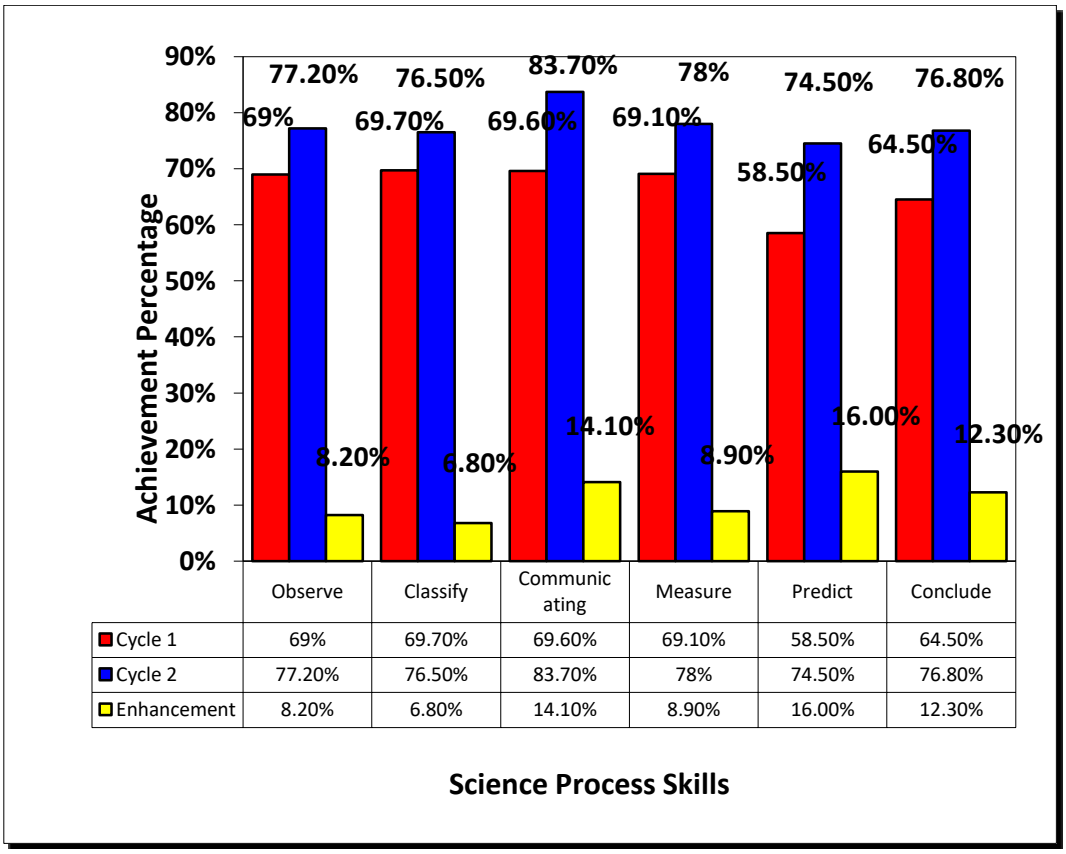

Figure 1. Diagram of Science Process Skills

This percentage of achievement is obtained based on the analysis and scoring adjusted to the rubric for assessing science process skills. The six indicators of science process skills have reached the target until the second cycle of research. In fact, according to Farida (2013: 45), asking questions is a fundamental skill that students must have studying a problem and further and to develop students' curiosity. Overall, students are generally skilled in making questions. Thus, improving students' science process skills cannot be separated from the students' learning activities. In implementing problem-based learning, student learning activities begin when the teacher orientates students to the problem. Students observe and utilize various sources to determine strategies in solving problems (Yuliati, 2016). Integrated Science Process Skills indicators include variable identification, tabulated data, variable definition, hypothesis generation, investigative analysis, investigative design, experiments, and graphing. (Bulent, 2015). Integrated category science process skills are obtained from middle class or grade 5 to grade 8 (Mutisya et al., 2013). Based on the analysis results, it was obtained that there was a significant increase in science process skills after the implementation of the Learning Cycle 5E learning model with an N-gain of 0.5696, which was included in the medium improvement category (Tania & Murni, 2017).

(Ajul et al., 2019) stated that the analysis of the results of observations on student activities was carried out while learning was taking place using a student activity questionnaire. The stages or phases observed in this questionnaire are the same as the lecturer's activity questionnaire, namely by being wise to contextual pursuits. However, the indicators observed in lecturers and students from each of these stages are different. The student activity questionnaire was also observed by two observers who were the same as the lecturer activity observers. The observation results obtained during learning using contextual learning in improving science process skills. Student learning outcomes in each research cycle have increased. Researchers carry out analysis and reflection to record things that occur in the research cycle and improve them in the next cycle until student learning outcomes reach the specified target (Krisparinama et al., 2020)

The achievement of each indicator of science process skills is based on the value obtained from the science process skills data. The results of these science process skills are presented in table 1.

Table 1. The average score of science process skills on each indicator

No.	KPS	Cycle 1	Cycle 2	Ket.
		Average	Average	
1	Observing skill	2,2	2,6	Increased
2	Classification skill	2	2,5	Increased
3	Communication skill	2,1	2,5	Increased
4	Measuring skill	2,2	2,3	Increased
5	Prediction skill	2,2	2,5	Increased
6	Summing skill	2	2,5	Increased

Description of the criteria for science process skills:
1-1,49 = less skilled
1,50-2,49 = sufficiently skilled
2,50-3 = skilled

Based on the data, it can be seen that science process skills have increased with increasing scores on each indicator of science process skills and the achievement of science process skills, which has increased. From the data of science process skills in table 1, it can be seen that science process skills in cycle one all indicators of science process skills have a score of 2, which means that students are skilled enough in learning during cycle 1 with the field study method. Then in cycle 2, all indicators of science process skills have increased, namely with a score of 3, which means that students are skilled in learning

during cycle 2 with the field study method. However, on measuring indicators when rounded, the value of observing and classifying indicators is still at score 2 with sufficient criteria skilled.

2. Concept

Understanding the concept is done by giving a test at the end of the cycle. Based on the tests conducted, students' understanding of concepts in cycle I to cycle II has increased. Based on the conceptual understanding test analysis in cycle I and cycle II, the test results were obtained with a percentage increase of 13.7%. In table 12, the average column percentage of competency attainment from each indicator already has the absorption or competence that reaches the expected target. This achievement percentage was obtained based on the analysis and scoring adjusted to the rubric of concept understanding assessment 4.

Based on the research results on the improvement of students' conceptual understanding above, it can be seen that the average percentage in cycle I was 70.5%. It seems that the result at the indicator of extrapolating is still low. It was 58.2%. The analysis of the results obtained shows that the first cycle has a common understanding of the concept. Meanwhile, in the second cycle, the average percentage was 84.2%. If we compare cycle I and cycle II, it is found that in cycle II, students with high mastery of conceptual understanding are relatively more significant than cycle I. This percentage increase shows that learning carried out by field study methods can improve science process skills and students' understanding of concepts.

Based on the maximum score set by the school, which is 100 in the material form. So, from the data that has been obtained. It can be explained that there is an increase in the number of students who reach the maximum score cycle I to cycle II. With an increase in the total score of 13.6, it can be seen that the total score in cycle II of 82.3 includes the criteria for understanding. Its shows that the application of field study learning can improve students' conceptual understanding.

Based on data from the observations of teachers and observers, science process skills in learning with the field study method increased from cycle I to cycle II. It shows that the learning process has been carried out well, and science process skills and conceptual understanding can improve. By the results of research conducted by (Wibowo et al., 2013), using the field study method can improve science process skills and conceptual understanding. Science learning that starts from concepts, in general, will be more effective if it is carried out through a learning model that includes information processing clusters.

The information processing model is based on processing information received by individuals (Surati, 2015). Understanding mathematics is knowledge of unrelated concepts and the ability to explain the relationships between them. Thus, students with conceptual understanding can organize their knowledge and explain it as a coherent system (Siregar, 2017). indicators of conceptual understanding, namely (1) writing down the concepts that have been studied; (2) applying the concept in a structured manner; (3) presenting the concept (Claudia, 2017).

Based on the observations made by researchers and observers. The field study method has aspects that affect the improvement of science process skills and conceptual understanding. Namely, learning with direct objects, direct student involvement, and material/information obtained directly will be long remembered. These aspects can be seen in the field notes that with field studies, students' knowledge becomes developed and skilled because they learn with objects directly. Student involvement in field study learners is more active than classical learning. The material or information obtained is more memorable and will be remembered longer to understand more about the concepts being learned.

4. CONCLUSION

Science process skills are assessed at a percentage of each indicator of science process skills. The percentage of all students in class VII.1 science process skills increased, seen in science process skills from cycle I to cycle II. In the first cycle, the average percentage of science process skills attainment was 66.7%, then in the second cycle, it became 77.8%. The percentage of achievement in science process skills of all students is above 70%, which indicates that they already have high skills. It is supported by research (Yulasti et al., 2018) which states that the increase in learning outcomes of science process skills in each of these cycles explains how students' mastery the material being taught. In this case, the role of the teacher is a motivator.

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