

The Enhancement of Process Skills and Cognitive Learning Outcomes of Science in Elementary School Through Inquiry Learning

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Abstract: *The purpose of this study is to: describe the inquiry learning and enhance skills through inquiry learning process and learning outcome. This study design is a Classroom Action Research (CAR) which composed of two cycles. Each cycle consists of four stages: planning, implementation, observation and reflection. The subject of this research is the third grade students of SDN Pangarangan III Sumenep in the academic year of 2015/2016. Data on process skills in science is gathered through observation. The data were analyzed by using qualitative descriptive analysis. The findings of this study indicate there are improvement of skills and the cognitive learning process of students. In the first cycle, the students' science process skills reached 71.29% and an increase in cycle II reached 91.20%. For learning outcomes, results of study on the first cycle reached 74.21% and an increase in cycle II reached 81.15%.*

Keywords: *Process Skills, Science Cognitive Learning Outcomes, Inquiry Learning*

I. Introduction

Science education is expected to become a vehicle for students to learn about themselves and the environment, as well as prospects for further development in applying it in our daily lives. The learning process emphasizes to provide direct experience to develop competencies in order to explore and understand the universe around us. Science is necessary in everyday life to meet human's needs through solutions to problems that can be identified. The implementation of science needs to be done wisely so as not to adversely affect the environment.

In fact, sometimes the learning that has been implemented at schools has presented verbally through lectures and text books with low students' involvement, less attracted the attention of students and tedious. Teachers rarely use appropriate media to engage students in conducting an experiment. In discussing the learning materials teacher rarely develop group discussions, classroom activities, and inquiry. As a result, students' understanding of the concept is low, process skills and scientific attitude of students are not growing and student learning outcomes is low, has not achieved optimally as the demands of the curriculum.

Teachers should be able to determine appropriate approach and methods for science learning concepts, making it more attractive and motivate the students to inquire. The results of previous research studies show that science learning in elementary schools is still widely conventional (teacher-centered learning) and learning outcome in science is still very low when compared to other subjects (Hilman, 2014). To anticipate the problems, it is necessary to improve the quality of learning in order to enhance the activity of the students, science process skills, and scientific attitudes while improving students 'science learning outcomes. One of alternative approaches in science that can be applied to improve process skills, scientific attitude and quality of teaching science is the inquiry approach.

Science learning in elementary school, in addition to the skills students understands the process; students are also expected to master some cognitive competencies. At each end of the learning process, students are expected to demonstrate abilities in cognitive domain. Cognitive achievement is the result of learning related to intellectual ability. The cognitive learning is gained through activities to remember, understand, analyze, evaluate and create. (Permendiknas No. 65/2013). Cognitive achievement that is earned by the students after getting a learning experience for a predetermined time, showing to what extent students can master science concepts in learning.

Inquiry learning is designed to encourage students to inquire, develop critical thinking, increase their skills and carry out the implementation. This means that the principle of science learning is an active process. Active process has implications for mental and physical activity. It means that, *hands-on activities* only are not enough, but the *mind-on activities*.

Some studies have shown that the inquiry learning approach is proven to improve the skills and student learning outcomes. Finding from classroom action research (CAR) conducted by Kristianingsih (2010) revealed that the implementation of inquiry learning model with pictorial riddle method can improve student learning

outcomes. Other study by Hilman (2014) found that guided inquiry learning with mind map gives a significant positive effect on science process skills and learning outcomes.

II. Methods

This research is a classroom action research (CAR). According to Wiraatmadja (2008) classroom action research is how a group of teachers can organize the conditions of their instructional practices, and learn from their own experience. They can try out some ideas for improvement in their instructional practices, and see the real effect of that effort. In the planning stage, there were few things that are carried out by researchers such as develop learning tools in form of lesson plan, and create research instruments and determine the implementation of observation.

Subjects in this study are 19 students of the third grade students of SDN Pangarangan Sumenep in the academic year of 2015/2016, consisting of 10 males and 9 females. Data in this research is the process skills, cognitive learning outcomes, and inquiry learning process. Data source can be seen in the following table.

Table 3.1 Data Source of the Research

No	Variable	Instruments	Data collection technique	Source of Data
1	Inquiry	Observation sheet for the inquiry learning implementation	Observation	Teachers and Students
2	Process Skill	Skill process sheet	Observation	Students
3	Cognitive Learning Outcomes	Cognitive Test	Written Test	Students

The data in this study is collected through observation sheets, test, interview and documentation. Data is processed using descriptive-qualitative analysis. In this study, the cognitive learning outcome data is obtained through final written test. Students are said to be thoroughly studied if they have reached a passing grade standard as determined by the school. Below are the criteria for assessing the learning implementation by teachers and students and Students Skill Process.

Table 3.2 Criteria Observation for the Learning Implementation

No	Mean (%)	Criteria
1	81-100	Very Good
2	61-80	Good
3	41-60	Good Enough
4	21-40	Not Good
5	0-20	Very Bad

Table 3.3 Criteria for Observation for Students' Skill Process

No	Percentage	Criteria
1	81-100	Very Good
2	61-80	Good
3	41-60	Good Enough
4	21-40	Bad
5	0-20	Very Bad

III. Findings

This CAR took place from January 11 until January 23, 2016. It was conducted in two cycles involving 19 third grade students of SDN Pangarangan III-A Sumenep. There are two cycles; the first cycle consisted of three meetings and one meeting for final test. Second cycle consists of two meetings and one meeting for final test.

The learning has increased from the first cycle to the second cycle. The average level of teacher's activity is 77.26% in the first cycle to 88.63% in the second cycle. For learning activities by students, the average rate of 78.33% in the first cycle to 89.99% in the second cycle, so that the implementation of the learning activities by teachers and students from the cycle I to cycle II is increasing.

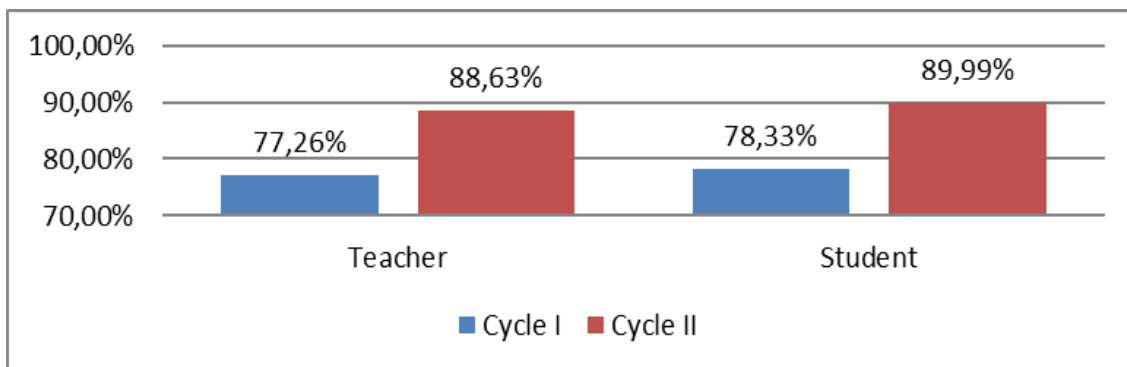


Figure 1 The Implementation of learning activity by teachers and students

The implementation of inquiry learning in general has increased significantly. Science process skills consists of a number of aspects of skill that every aspect has an indicator of each different. Then the ability is measured is observe, classify, communicate, measure, predict, conclude.

From the of research findings in the first cycle, almost all the students are able to perform (observe, classify, communicate, measure, and conclude). In general, the success rate in the first cycle is at a good level with an average of 71.29%, while in the second cycle, these students are at a very good rate with 91.20%. The data shows students 'skill after learning has increased very satisfactorily; it is seen from the average scores obtained by students in each cycle. In the first cycle an average of 71.29% while students' process skills in the second cycle gained an average of 91.20%. In this case there is an increase from the first cycle to the second cycle. The learning outcomes of students in the first cycle obtained an average of 74.21%, while in the second cycle gained an average of 81.15%.

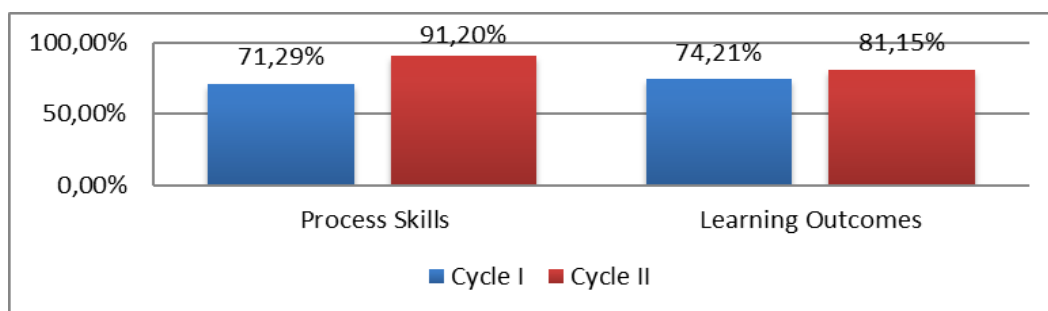


Figure 2 the Implementation of Process Skills and Learning Outcomes

IV. Discussion

Inquiry learning model in this study aims to determine the process of increasing skills and student learning outcomes. Skills learning process and science learning outcomes on the second cycle increased when compared to the first cycle with regard to three things, among others; students can remember material learnt; inquiry approach is more effective in improving students' critical thinking skills; all students do a final test cycle with an honest and serious; all students complete the final test cycle in a timely manner.

In the second cycle, students' science learning outcomes has increased. Increased percentage is related to the specific characteristics inquiry method that involves the students to draw up a concept of science by involving students in the investigation of the facts of everyday life. The activities of the student's inquiry involving all the students' ability to find out solutions to a problem in a systematic, analytical and logical so that students can arrange their own findings into a knowledge that can be understood by students. It is concluded that the students' knowledge can be more memorable for long time. Teachers in the implementation of the method of inquiry is doing guidance to each student intensively at each stage of inquiry, so that students can build knowledge through interaction with the object being studied (Suhaeti, 2008).

Teachers who use inquiry learning can produce students who have a high level of knowledge. (Liu, et al, 2010) Inquiry also can facilitate students in improving thinking ability (Rushton, et al, 2011). Inquiry-based learning, can improve scientific process skills and attitudes of students. Inquiry learning can press students to actively think and draw conclusions of data, improve conceptual understanding is required in the current contextual assessment standards (Daphne, et al, 2009). It is clear that inquiry is learning to make students active in class to understand concepts and can enhance students' skills in problem solving, critical thinking and creative with a step by step learning inquiry are as follows: (1) describe the topics, objectives and learning outcomes to

be achieved; (2) formulate the problem undertaken by students; (3) formulate hypotheses; (4) to collect data; (5) testing the hypothesis; and (6) formulate conclusions.

The implementation of inquiry learning model can help the students learn through the activity to build their own knowledge. Through the teaching inquiry, children will become independent learners with their curiosity and explore something with the guidance of teachers so inquiry can be used to implement active learning (Soetjipto, 2001). According to Santoso (2008), the importance of inquiry includes four grounds, namely; (1) improve students' intellectual; (2) raises the motivation of the students; (3) help students strengthen memory; (4) help students learn to find. Science learning activities using the inquiry method to improve student learning outcomes face problem of low student learning outcomes science.

Based on the observation, it can be said that in the first cycle not all phases of activity by the teacher can be accomplished. At the beginning of the activities teachers do not explore the students' initial knowledge but connecting directly question the old concept with a new concept that will be taught. This is done because in the first cycle teachers are still have difficulties in the management of time and felt the lack of time to carry out all steps inquiry learning. These circumstances are in accordance with the opinion of Sanjaya (2011: 208) who states that one of the weaknesses of inquiry learning is difficult in planning phase. Meanwhile, according to Anam (2015) inquiry also requires a long time, especially on first meeting. In line with the constraints in time management, researchers advise students to cope with the task between members of each group. So within the limited time, each group have been able to complete the task in problem solving. Through this way eventually on the second cycle of learning all the steps can be accomplished.

In the core activities, the students still have difficulties in formulating an issue and make a hypothesis. This is in accordance with the opinion of Anam (2015) who says that the inquiry learning implementation needs longer time and the necessary arrangements and good time management. Nevertheless, by providing guidance and encouragement eventually all stages of learning can be done well.

The important thing in implementing such an inquiry in primary school is giving guidance in formulating the problem. Students are required to formulate their own problems, but in fact, they still have difficulties to do so. In this stage the teacher should provide questions that could provoke the students so that they can formulate their own problems. Based on the results it shows that in the first cycle not all measures of inquiry can be achieved well. At the beginning of activities some students listen and pay attention to the explanation of the teacher, and some other doesn't. This happens because in the first cycle is the initial activity of inquiry learning in which students are not familiar with. Students still do not understand about the activities to be done and yet to fully concentrate on understanding of teacher' explanations.

At the first meeting and the second time, it takes students to discuss and solve the problem that is longer than the allotted time by teachers, therefore, when time runs turned out the student's task has not been completed. Time management is very critical because they may take longer time to discuss. Students can formulate problems and hypotheses and then do the experiments. From these experiment students gain further data that must be analyzed within the group and the results were presented to the other groups. This is essential for the successful implementation of such an inquiry because at this stage the student will be responsible for both individuals and groups to find the concept of learning. In inquiry learning all students are directed to seek and find their own answers from the problem so that it will increase their confidence.

V. Conclusion And Recommendation

From the results of data analysis and discussion, it can be concluded that (1) the inquiry learning process can improve the skills and student learning outcomes for the third grade students at SDN Pangarangan III Sumenep. (2) Process skills of students and learning outcomes are increased. They can observe, classify, measure, predict, summarize and communicate. The implementation of inquiry learning process is increase.

Based on the conclusions obtained, the researchers give the following recommendation to the teachers. (1) Students should be given the motivation for process skills they owned and 2) teachers are encouraged to apply inquiry learning in improving the skills of students learning process in science.

References

- [1] Anam, K. 2015. *Learning Based Inquiry: Method and Application*. Pustaka Pelajar
- [2] Daphne, D. Levy, A and Century, J. 2009. Inquiry-Based Instruction –What Is It and Does It Matter? Results from a Research Synthesis Year 1984 to 2002. *Journal of Research in Science Teaching*, 47 (4): 474-496.
- [3] Depdiknas.2013. *Education Unit Level Elementary School Eyes Lesson IPA SD / MI*. Jakarta: MONE
- [4] Hilman. 2014. *Effect of Guided Inquiry Learning with Mind Map of the Science Process Skills and Learning Outcomes Students IPA*. Unpublished thesis. Malang: State University of Malang. Kemmis, S & Toggart & (1980). *The Action Research Planner*. Victoria: Deakin University
- [5] Kristianingsih,DD., Sukiswo, Khanafiyah, S. 2010. *Peningkatan Hasil Belajar Siswa Melalui Model Pembelajaran Inkuiri Dengan Metode Pictorial Riddle Pada Pokok Bahasan Alat-Alat Optik di SMP*. *Jurnal Pendidikan Fisika Indonesia* 6 (2010) 10-13.

- [6] Liu, O., Lee, H., and Linn, M. 2010. An investigation of Teacher Impact on Student Inquiry Science Performance Using a Hierarchical Linear Model. *Journal of Research in Science Teaching*, 47 (7): 807–819. (Online) (<http://onlinelibrary.wiley.com>), retrieved 2 December 2015.
- [7] Sanjaya, W. 2011. *Standard Process Oriented Learning Strategy Education*. Jakarta. Kencana Prenada Media Group.
- [8] Santoso. 2004. *Group Dynamics*. Jakarta: Bumi Aksara.
- [9] Soetjipto, B. E. 2001. Inquiry as a Method of Implementing Active Learning. *Jurnal Ilmu Pendidikan*, 8 (3). (Online) (<http://journal.um.ac.id/index.php>) Diakses 19 Desember 2015.
- [10] Suhaeti. N.(2008). *Application of Inquiry Approach to Improve Science Process Skills Ability Students on Energy Concepts and its amendment in State Elementary School fourth grade Lengkong Bojongsoang District of Bandung Regency*. Unpublished Thesis UPI Bandung.
- [11] Wiraatmadja, R (2008). *Classroom Action Research Methods*. Bandung: Remaja Rosdakarya.