

# **Analysis of Science Process Skill on Science Learning in Primary School**

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**ABSTRACT:** Science process skills are the basic competencies to develop a scientific attitude and skills in solving problems so that it will form the students personal creative, critical, innovative, and competitive in the global competition in society. This study aimed to describe the learning process of science and science process skills Elementary School fourth grade students in science subjects at two schools in Surakarta. This research is a qualitative study with case study approach. The results of the study, indicating that teachers tend to use conventional learning methods and models in the subjects, teachers do not understand the innovative learning model as Problem Based Learning and several other innovative learning models. Teachers tend not to optimize the process of learning science because it is constrained by time. Value for teaching science students classified in the category of medium and low. Students are enthusiastic in participating in learning science if the teacher uses experimental methods outside the classroom or learning with the outdoor learning approach. Science process skills of students are still relatively low, it is because teachers rarely conduct experiments in science teaching.

*Keywords: analysis, science process skills, science learning*

## **INTRODUCTION**

In regulation no. 22 of 2006 on the Content Standards (SI) and Regulation no. 23 of Competency Standards (SKL) in 2006 explained that the Natural Sciences (IPA) is a science that was born and developed based on observations and experiments. Thus, to learn science is not enough to simply memorize facts and concepts that are so, but demanded also find facts and concepts through observation and experimentation. Through education and the teaching of science or science students are invited to explore nature. Through this process science, Process Skills can be developed, so that the true experience of science can be obtained. This explanation is reinforced by Rustaman (2007) that aspects of the process demanded in learning science,

Very important science process skills possessed by the students to face the challenges of globalization that demands competition between humans. Science process skills are one of the skills that must be developed in education, especially in science or science learning. Science process skills are the basic competencies to develop a scientific attitude and skills in solving problems so that it will form the students' personal creative, critical, innovative, and competitive in the global competition in society (Turiman, 2012). According to Rustaman (2003), science process skills are skills that involve cognitive skills or intellectual, manual and social. Cognitive skills involved because by doing process skills students use their minds, while the manual skills involved because it involves the use of tools and materials, measurement, preparation or assembly tools. Social skills are involved because of the interaction between teachers and students in implementing the teaching and learning activities.

According to Semiawan (2008), there are several reasons for the importance of science process skills in primary teaching and learning activities in science learning, namely: 1) the development of science takes place more quickly so that teachers no longer possible to teach facts and concepts to their students; 2) students easily grasp complex concepts and abstract if accompanied by examples is reasonable in the circumstances faced by practicing his own way;

3) discovery of science is not absolute but relative inventor. One theory might be refuted and rejected by the people who get the new data that can debunk a theory espoused. Reappear containing principally new theory of relative truth; 4) the learning process should not be separated from the development of the concept of development of attitudes and values of students that students more easily understand complicated concepts and abstract if accompanied by a concrete example or through real objects. So that students learn actively and creatively in developing the skills to produce a concept.

The learning process is the process skills approach to teaching and learning processes are designed so that students can find facts, concepts, and theories with scientific process skills and attitudes of the students themselves. But is happening in the world of education, science process skills in schools have not developed optimally . The National Examination (UN) is one indicator that can be considered to see the level of science process skills of learners. Science process skills of students in Surakarta, classified in the lower category. The average value of the UN elementary school science subjects in the last two years is below 65, although the figure has already reached the limit of graduation for students. However, the average increase in the last two years there are significant numbers, only achieve increased to 0.67, the average value of the UN in 2015 (62.66) and 2017 (63.33). Learning science suboptimal be one of the factors that lead to conditions such as exposure above. Novita research results et al., (2014) found that the factors causing low science process skills of students in elementary school due to election methods in learning poses and also the selection of the lack of proper learning model.

Based on the results of preliminary observations conducted by researchers at the two schools in Surakarta, namely SD Semanggi Kidul and SDN Mijen Surakarta researchers discovered facts on the ground that one of the main factors that lead to low capacity nor the science skills of students in the science of learning; (1) learning is still centered on the teacher or the teacher center. In the implementation of the learning process in the classroom teachers are still using methods and models of learning conventionally. As a result of learning in the classroom to be less attracted to the attention of students so that the students' ability to understand and master the material to which it becomes very low. The method and the learning model used by the teacher is less able to facilitate students to develop science process skills. (2) Teachers still do not understand the use of an innovative learning model that can be applied in the classroom. During the learning process in the classroom teachers are only based on the written material in the sourcebook. Lessons are conducted not supported by the media and props are adequate. (3) The average grade science subjects students classified in the category of medium and low.

## **METHOD**

This study is qualitative research with the case study approach conducted in elementary school are SDN Mijen and SDN Semanggi Kidul in Surakarta City. The method of qualitative research is a research method that is based on the philosophy of positivism, is used to examine the condition of the object that is natural, (as his opponent is an experiment) where the researcher as an instrument of key, sampling data source is purposive and snowball technique merging with triangulation (combined) , data analysis is inductive/qualitative and qualitative research results further emphasize the significance of the generalization (Sugiyono, 2015). Sukmadinata (2013) states that a case study is a study that is directed at collecting data, taking meaning, and gaining an understanding of the case. The reason the researchers choose the same school as the research object is 1) Schools have used the curriculum in 2013 as a curriculum which is used in the learning process in the classroom, 2) the school is included in the category

of schools accredited A or better. Data collection techniques used research through observation, interviews, and documentation. Each Data were analyzed using Model Miles and Huberman.

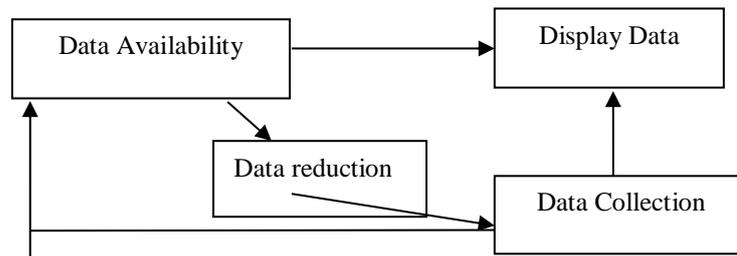


Figure 1. Analysis Data Model Miles and Huberman (Sugiyono, 2015)

Broadly speaking, the stages of this research can be described as follows;

1. Develop research instruments in the form of guidelines for the interview.
2. The collection of data, in the form of interviews, observation and found some documents related to science process skills in science subjects.
3. Analysis of the data by reducing the research results from various data collection.
4. Prepare reports on research results.

## RESULTS AND DISCUSSION

Before researchers conducted observations and interviews in elementary school, the researchers first conducted an analysis of students' science process skills in science learning in Indonesia based on research by PISA (Program for International Student Assessment). PISA results for science in the years 2009-2015 can be presented in the figure below:

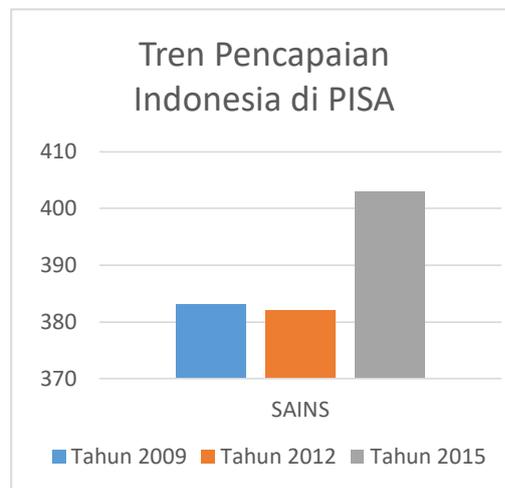


Figure 2. Program for International Student Assessment

Based on the PISA results from years 2009-2015, There is a significant increase. In 2009, a score achieved by Indonesia in the field of science is 383 points, then experienced a decrease 1 point in 2012 to 382 points. By 2015 the score has increased 403 points. Referring to the increase shows there is progress in science learning. Although the achievement of Indonesia has increased, Indonesia is still lagging compared with the other countries that also in PISA members. This is evidenced by the ranking of Indonesia which is ranked eighth-lowest among

the participating countries PISA (OECD, 2016). To know directly related to how the learning conditions of science and see the level of science process skills in school.

The results of observations conducted by researchers at Semanggi Kidul and SDN SDN Mijen Surakarta city, obtained information as follows:

1. Teachers tend to use conventional learning methods and models in science due to adjusting to the time and circumstances of students.
2. Teachers do not understand the innovative learning model as Problem Based Learning and so on.
3. Teachers tend not to optimize the process of learning science or science because it is constrained by time.
4. Value for teaching science students classified in the category of medium and low.
5. Students are enthusiastic in participating in learning science if the teacher uses experimental methods outside the classroom.
6. Science process skills of students are still relatively low, it is because teachers rarely conduct experiments in science teaching.

The results of observations conducted by researchers at the Semanggi Kidul and SDN Mijen Surakarta city is supported by interviews with a fourth-grade teacher, the findings on interviews among others :

#### ***Interview with the fourth-grade teacher at SDN Semanggi Kidul***

**Teachers tend to use conventional learning methods and models in science due to adjusting the time.** The findings are based on interviews with the teacher. *"Would you use an innovative teaching model in science subjects?"*. yes but adjusted to the time and conditions of the students. The model most often used method and model of lecture and also using the experimental method. Model experiments are sometimes used if there is a material that does require experimentation activities.

From these statements, it can be seen that never done learning science teacher or science with innovative learning model one experimental method but due to consider the issue of time eventually, teachers rarely use innovative learning model. Much needed innovative learning model in the learning process of science to improve student motivation, help students understand the material and improving students' science process skills. The opinion was supported by research conducted by Prato (2018). The results of the analysis of students' responses to a questionnaire study showed that positive result of the application of guided inquiry learning model. The application of guided inquiry learning models can increase students' motivation, curiosity, and help students understand the material. This research was supported by Sofiati (2014) with the findings of inquiry learning can enhance students' science process skills.

**Science process skills of students are still relatively low, it is because teachers rarely conduct experiments in science teaching.** These findings are based on interviews with teachers. *"What about the level of science process skills of students?"* To level science process skills of students in learning science are still relatively low, due to constraints of time, it is in a process of learning science or science in the classroom is rarely used experimental methods and it is one factor that makes the level low student science process skills.

Based on the results of these interviews it was found that the level of science process skills of students classified in a lower category, infrequent use of the experimental method in learning IPA is one of the main causes, therefore if other materials require experimentation activities and

students will find it difficult. The innovative approach in science learning such as using the experimental method can trigger the abilities and interests of students students interest in learning, bring creativity and scientific research, and, on the other hand, to introduce the scientific culture, thus enhancing the skills of the students in conducting an experiment or scientific method(Touli, 2018),

**Value for teaching science students classified in the medium category.** These findings are based on interviews with teachers. *"How is the value of students in science subjects are included in the category, high, medium or low?"* Some students are in the process of learning science enthusiastically when the teacher explains and active in the activities of the group and their value is high, but the average value students in grade 4 in the category enough or is said to be moderate. When compared with the value set KKM school is above 70. based on data obtained shows the results of these interviews, most students received grades below a minimum completeness criteria (KKM) set. This is in line with research conducted by Rukmaliani (2018) the use of inquiry learning model affect the results of students' learning of Natural Sciences. Innovative learning models such as inquiry learning model can enhance the enthusiasm and curiosity of students in the learning process so that it can be influenced by the results of student learning.

Students are very enthusiastic and have a high level of learning motivation in following science teaching if the teacher uses experimental methods outside the classroom. *How is the level of motivation or enthusiasm of the students in the learning process of science?.* Students are motivated to learn when the main high enough outdoor learning, they were very happy when the students learn outside the classroom. Based on the results of these interviews found that students have high motivation to learn if the teacher uses the method and the learning model that spurs students' activity, as well as the use of experimental methods which do outdoors with the outdoor model of learning.

This relates to the study conducted by Shin (2017) who found that motivation has a direct influence on several factors of motivation in science learning, such as motivation to learn, need to learn, and self-efficacy. Student motivation in science learning is increased when used models of STEM learning.

### ***Interview with the fourth-grade teacher at SDN Mijen***

**Teachers tend to use conventional learning methods and models in science.** The findings are based on interviews with the teacher. *"Would you use an innovative teaching model in science subjects?"*. yes but rarely because there are several factors, such as difficulties in understanding new models of learning and difficulty in conditioning the students in the classroom.

From these statements, it can be seen that never done learning science teacher or science with an innovative learning model, but its use is very rare. Lack of understanding of teachers to innovative teaching model and the difficulty of teachers to create conditions conducive to the learning process, they cause teachers have used an innovative learning model as a whole. This is in line with research conducted by Ugbe (2009) found a significant relationship between the competence of teachers to student learning outcomes in science subjects, namely chemistry. Students are taught by experienced teachers and have a good competence will gain better learning outcomes.

Science process skills of students are still relatively low, it is because teachers rarely conduct experiments in science teaching. These findings are based on interviews with teachers. *"What*

*about the level of students' science process skills?"* Science process skills of students in learning science still classified in the category of medium and low. Most of the students in the category of being to the level of science process skills, students can conduct experiments or scientific method, but at the time of the group's activities and report the results of the experiment, the students are still experiencing difficulties. From these statements, it can be seen that most of the students did not master some of the main indicators of science process skills in the reporting stage or the indicator summed up the results of the experiment.

Kazemi (2005) states that the development of science skills enable students to acquire the necessary skills to solve everyday problems. So it can be concluded that, if the science process skills can be mastered by the student it will be easier for students to understand the material, find the facts, concepts, and train skill critical thinking and raise the curiosity and motivation of students in the learning process.

**Value for teaching science students classified in the category of medium and low.** These findings are based on interviews with teachers. *"How is the value of students in science subjects are included in the category, high, medium or low?"* Some students have a low level of understanding not only in the subjects of science but also in understanding the subject matter more, it has an impact on student learning outcomes. Most of the value of science subjects or science students in the category of medium and low. Based on interviews with grade 4 teacher that the level of student understanding affect the results of his study, so it is not only a factor of performance or competence of teachers that influence student learning outcomes but also on the level of understanding of the students themselves, differences in the level of understanding of students to understand the material can be caused by several factors such as motivation to learn, family, as well as environmental factors of society. Results of research conducted by Wijaya (2013) found that several factors affect student learning outcomes, among others; learn motivational factors, family factors, school factors and environmental factors of society. The family factor is the closest neighborhood students to get an education because the family is primary education for a child. Shah (2014: 135) states: "The nature of parents, family management practices, and demographics of the family (home location) everything can be a good or bad impact on student learning and learning outcomes. school factors and environmental factors of society. The family factor is the closest neighborhood students to get an education because the family is primary education for a child. Shah (2014: 135) states: "The nature of parents, family management practices, and demographics of the family (home location) everything can be a good or bad impact on student learning and learning outcomes . school factors and environmental factors of society. Family factor is the closest neighborhood students to get an education because the family is primary education for a child. Shah (2014: 135) states: "The nature of parents, family management practices, and demographics of the family (home location) everything can be good or bad impact on student learning and learning outcomes.

Students have a high level of learning motivation in following science learning if teachers do learning activities outside the classroom. *How is the level of motivation or enthusiasm of students in the learning process of science?* The students were happy when the learning process is done outdoors or outside the classroom. However, sometimes it is difficult to organize students and create a conducive atmosphere for some students when learning outdoors more than happy to play.

Learning outside the classroom is an alternative to seeking a new atmosphere so that students do not feel bored in following the learning process. Students can take advantage of the environment as a source of learning as the schoolyard, field, school gardens. Lin Ting (2014)

revealed that the ability to observe can be improved by extending the learning process beyond the classroom instructional so that it can provide an opportunity to see, touch, feel, smell and hear that require the use of all the senses.

## CONCLUSIONS

Preliminary results of observations conducted by researchers of the level of science process skills of students in the school are (1) learning is still centered on teachers who make students become passive in the learning process and only receive the information provided by the teacher. So that the learning process of students do not have freedom of thought and less digging for information it receives. (2) Learning science tends to be limited to verbal delivery so that the teacher's role is still dominant in the learning process. (3) Teachers still do not understand the use of an innovative learning model that can be applied in the classroom. Teachers were solely concerned with the learning step is usually done with the material written on the book source (4) the limited props KIT resulting IPA or science teacher can not perform optimally science learning process. Besides, the ability of students in exploring and applying IPA less attention.

The result of observation is also supported by the results of interviews with teachers Elementary School fourth grade in SDN Semanggi Kidul and SDN Mijen, from interviews obtained information as follows:

1. Teachers tend to use conventional learning methods and models in science due to adjust to the time and circumstances of students.
2. Teachers do not understand the innovative learning model as Problem Based Learning and so on.
3. Teachers tend not to optimize the process of learning science or science because it is constrained by time.
4. Value for teaching science students classified in the medium category.
5. Students are enthusiastic in participating in learning science if the teacher uses experimental methods outside the classroom.
6. Science process skills of students are still relatively low, it is because teachers rarely conduct experiments in science teaching or science.

Based on the results of observations and interviews it can be concluded that the science process skills of students in science learning are in the low category, it is due to some obstacles or problem faced by both teachers and students in the learning process. the tendency of teachers to use old methods and the teacher rarely used experimental activities in the classroom is one of the factors causing the lack of students science process skills.

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