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INQUIRY-BASED LEARNING WORKSHEET TO IMPROVE UNDERSTANDING SCIENCE CONCEPTS IN ELEMENTARY SCHOOL

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh Lembar Kerja Pembelajaran Berbasis Inquiry untuk meningkatkan penguasaan konsep sains di Sekolah Dasar. Penelitian ini menggunakan quasi eksperimental sebagai metode penelitian dengan desain penelitian pretest-posttest kelompok tunggal. Pengamatan dilakukan dua kali dalam desain penelitian yang dilakukan sebelum perawatan dan setelah perawatan. Pengamatan yang dilakukan sebelum perawatan (O) disebut pretest (tes awal) dan observasi yang dilakukan setelah observasi disebut post-test (tes akhir). Perbedaan atau gai antara tes awal dan tes akhir diasumsikan sebagai pengaruh perlakuan. Hasil dari penelitian ini menunjukkan bahwa lembar kerja pembelajaran berbasis inquiry memiliki efek untuk meningkatkan pemahaman konsep sains dengan 0,68 N-Gain (Kategori Menengah). Hal ini menunjukkan bahwa lembar kerja pembelajaran berbasis inkuiri siswa dapat digunakan sebagai bahan ajar untuk meningkatkan pemahaman mereka tentang konsep sains.

Abstract

This research was aim to find out the effect of Inquiry-Based Learning Worksheet to improve mastering science concepts in Elementary School. This research used quasi-experimental as a research method with a single group pretest-posttest research design. The observation was made twice in this research design that are done before the treatment and after the treatment. The observation that took before the treatment (O) is called pretest (initial test) and the observation that took after the observation is called post-test (final test). The difference or gai between initial test and final test are assumed to be the influence of the treatment. The result of this study suggest that inquiry learning based worksheet has an effect to improve the understading of science concepts with 0.68 N-Gain (Medium Category). This shows that student's inquiry learning based worksheet can be used as teaching materials to improve their understanding of science concept.

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INTRODUCTION

Science learning is not only learning about knowledge but also a process in giving learning experiences to gain the knowledge (*how to know*). Therefore laboratorium activity or practical work are an essential activities and became an integral part from Science learning (Millar & Abraham, 2009). Learning in practice giving student a chance to interact with the object of science study. The student have an opportunity to do the direct observation, doing an exploration and understanding the object study of the science, in such a way that through practical work activity can also integrate hands-on activity with the thinking process.

The cohesiveness of phisical activity and thinking process surely will improve meaningfullness of learning experiences gain by the student. NRC as an institution of science and technology in America, explicitly suggest that the science learning process is shall set to teach for understanding. Science learning in practical one other thing to use inquiry-based learning worksheet as material teaching, that not apart from the inquiry characteristic which is a series of learning activities that include the entire maximum of students abilities to seek and investigate sistematically, critically, logic, analytically so that they can formulate their own finding with full of self-confident (Anam, Khoirul: 2015:11).

The essence of science learning process shall able to support high order thinking skill (Basey, et al, 2014). Learning in the curriculum of 2013 (K13) is directed for saintific process, so that inquiry process become one of the standard process in science learning on elementary school. Based on Kompetensi Inti and Kompetensi Dasar of K13 analysis is known that its demand of competition is not only in the area of knowledge or cognitive, the student are strive to own attitude and skill competitions. At the skills competetion one of the criteria to be gain by the student is to have high order thinking skills (creative thinking, problem solving and critical thinking). NRC (2006) stated that the inquiry-based learning should be a stadard in science teaching. Teacher should create inquiry-based learning experience for their student. The observation result

that has been carried on to science teacher in elementary school is found that the performance of inquiry-based learning is yet infrequently to be done, moreover the inquiry learning in the laboratorium, whereas the inquiry learning experience cannot be apart from laboratotium work activity. The minimum of this inquiry learning experience has an impact to the low of the students' high order thinking skill ability and their concepts mastering ability.

Inquiry-based worksheet is the important thing in learning science. Apllying inquiry-based worksheet has much benefits and relevance in the concepts understanding improvement (Kudhis, et al., 2015). Based on the problems, the research was conducted on science learning using inquiry-based worksheet to improve the concepts undertanding of the student's elementary science teacher candidate.

LITERATURE REVIEW

NSTA (2004) in Wenning (2007) define inquiry as a strong way in understanding science content. Inquiry also a learning approach that focus on process and skill that are needed in doing research. Worksheet inquiry-based learning in laboratorium can create learning experience for students to develop their interest, developing scientific inquiry skills, improving students' understanding and improving the abilities to apply scientific concepts (Wu, 2013). Inquiry-based worksheet learning in laboratorium can facilitate students direct involving in learning proces, they acquire the experience of doing the observation, identify the problem, arranging or formulating the hypothesis, designing experimentation, collecting data, comunicating research finding and formulating the conclusion. NRC (2000); Anderson (2002) stated that inquiry-base learning can improve meaningfulness of learning process.

Understanding concepts by the student is very important in learning process. Mastering process is needed by the students for doing intellectual activity, thinking process and applying concepts that have been learned. Dahar (1989) expalined that concepts have a very important part in all of the material subject learning process, because the concepts that is undertsood can be an instrument for thinking process. Concepts

understanding is mastery in abstraction that has one class or current object or relation which having the same atribution. Putra (2014) stated that mastering concepts is a student ability in understansing concepts varieties right in before learning process, during learning process and after learning process. Mastering concepts is a basic thing in understanding theory principles, which means that to understand the principe and theory then they must understand the concepts that arranges the relevant principles and theories. Mastering concepts can be seen from student abilities in solving multiple problems, both related with concepts or the application in recent situation. This later can be known thorugh the result of the student learning. The result of the student learning can describe their mastering concept before and after the learning activity. So that the mastering concepts includes whole of material because one of another of them is interrelated. Mastering concepts is an alteration of student's behavior that influenced from intellectual abilities which is included in scaffolding of: memorizing (C1), understanding (C2), applying (C3), analysing (C4), evaluating (C5) and creating (C6) (Anderson and Krathwohl, 2001).

MATERIAL & METHODOLOGY

This research used quasi-experimental method with single group pretest-posttest research design. This method is used to fing out the effect of a treatment to the subject research (Frankel, 1993). This research took twice observations which are before the treatment and after the treatment.

Observation that took before the treatment (O) is called pre-test (initial test), then observation after the treatment (O) is called post-test (final test). The difference or gain between initial test and final test is assumed to be the effect of the treatment. The design od the research in detail can be seen on Table 3.1

Group	Pre-test	Treatment	Post-test
Experiment	O	X	O

Tabel 3.1 Research Design

Explanation:

O : Pre-test to see the initial ability

X : Treatment in the form of practical work implementation using inquiry-based worksheet

O : Post-test to see the final ability after the practical work implementation using inquiry-based

Worksheet

The type of research instrument used in this study are stated below :

a. Mastering concepts test is aimed to find out the student science concept understanding level.
b. inquiry ability observation sheet is aim to find out the ability in inquiring after carrying out science learning process using inquiry-based learning worksheet.

Before using the insrument, the instrument is tested first to find the validity of question, reliability of the question, dificulty and difference capacuty levels, this test is carried out to the instrument test (Mastering Concepts Test).

RESULTS AND DISCUSSION

Result

Based on the result of mastering science concepts can be seen on the table below. Table 4.1 The result of mastering science concepts

No	Learning Indicator	Pre-test	Post-test	N-gain
1	Describing heat transfer concept on daily life.	60	90	0.75
2	Implementing heat transfer concept on daily life.	65	92	0.77
3	Analysing heat effect to the temperature and form on daily life.	57	85	0.65
4	Comunicating and describing the observation result related with heat transfer and heat effect on objects.	55	80	0.55
	Average	0.68		

From the table above shows that the increasing of learning result per learning indicator that seen from average increasing were obtained a data that the average increase of mastering concepts by the students is on the number of 0.68 that is on the medium level of increasing. From that data proves that inquiry-based learning worksheet isquite effective to improve the mastering concepts of the students. Based on the pre-test that is conducted in the begining of learning obtained result that all of the student are still in the "minimum" category or not yet in the level of minimum completeness learning. Hereafter practical work learning is conducted using inquiry-based learning worksheet and took the observation of the student activity during learning process along with the observation sheet that obteined a result that said 90% of the students have the ability to describe the concept in the level of C1 and C2 cognitive level. 92% of the students have the ability to implement concept that is on the C3 cognitive level. Later 85% students have the ability to analyse and connect it with the environment of concept which is on the C4-C5 cognitive level and 80% of students have the ability to comunicate their observation result ehich is in the C6 cognitive level. Process skill that dominate student's activity during learning process is the activity of observing (63,5%) and using tools and materials (65,4%)

Discussion

The research result in this study shows that on the average of N-Gain science mastery concepts 0,68 (average category), this proves that utilizing the inquiry-based learning worksheet can improve students science mastering concept. The inquiry-based learning worksheet that is employed has an inquiry-based special characteristics. The inquiry becomes the learning experience that is expected to be experienced by the student as they utilizing the worksheet. Else is that the inquiry learning experiences is also expected could develop scientific competence and attitude which have to be mastered by the student. Inquiry-based learning can be conducted by integrating the inquiry steps in practical work learning done in the laboratorium (Emden & Sumfleth, 2016).

Furthermore based on value and the result analysis of post-test data to

the science mastering concepts ability which given the learning using inquiry-based learning worksheet shows that as a whole the ability of mastering science concepts related with heat matter has increased the medium category. Thus, it can be concluded that there is a significant effect for learning in using inquiry-based learning worksheet to the science mastering concepts abilities. It in line with the characteristic of inquiry based learning process (Khoirul, Anam: 2015:13), that are: 1) Inquiry strategy emphasize maximally in searching and finding, 2) All the activities that carried out is directed to search and find the answer by their own self from things that is questioned, 3) Developing thinking abilities systematically, logic, critic or developing intellectual ability as part of the mental process.

Inquiry learning done through inquiry-based learning worksheet in laboratorium can facilitate student in direct involvement of learning process, student gained the experiences doing the observation, identify the problem, arranging or formulating hypothesis, designing experiment, doing experiment, collecting data, communicating the data from research result and formulating the conclusion.

Mastering science concepts can be interpreted as the student cognitive ability in understanding and mastering science concepts through phenomena, occurence, object or activity that related with science material. Student can master science concepts if they understand meanings in the process of events, phenomena and object through observation process. Measurement of the mastering science concepts can be conducted through tests, that are initial test and final test. Mastering essential science concepts is interpreted as the ability to master product, process and scientific attitude that is developed in Natural Science. Especially the mastering done by the student to the science learning as an activity of learning in classroom. Mastering essential science concepts by the students is directed to their intellectual abilities that contains science element as a product, science as a process and science as an attitude. Sulistyorini (2007) stated that in essence, science can be seen from the side of product, process and the side of an attitude

development. Meaning that, learning science has dimension of process, dimension of product and dimension of scientific development attitude. Those three dimensions are interrelated.

CONCLUSION

The average improvement of students' mastering concepts is at the number of 0.68 N-Gain which is on medium level of improvement. Meanwhile the students' inquiry ability which concist of making problem statement, formulating hypothesis, planning/implementing investigation, using mathematics to calculate/categirize, using data to make conclusion and comunicating steps and the result of investigation are proven in increasing mastering science concepts of PGSD student.

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