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Efforts to Improve Scientific Literacy of Students through Guided Inquiry Learning Based on Local Wisdom of Baduy's Society

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Abstract

The aim of this study was to determine the influence of guided inquiry learning model toward the improvement of students's scientific literacy in integrated science learning on environmental conservation concept based on local wisdom of Baduy's society. This study used Research and Development method through pretest and posttest test before and after the guided inquiry learning was done. The objects of this study were 31 students who were following the integrated science lecture in 5th semester which is prospective science teacher. The results showed that there was an improvement in students' scientific literacy after guided inquiry learning (was applied) as shown with a gain value of 0.16 (N-Gain = 0.16) which was included in the medium category. Based on this result, it can be concluded that there is the influence of guided inquiry learning model toward the improvement of students's scientific literacy in integrated science learning on environmental conservation concept based on local wisdom of Baduy's society.

Keywords: Scientific Literacy, Guided Inquiry, Local Wisdom, Baduy's Society

INTRODUCTION

Scientific literacy is important to be mastered by learners (Toharudin, et .al, 2011). The scientific literacy in the context of this research refers to the way the students were able to understand the environmental, health, economic, and other problems faced by modern society that very heavily on technology and development of science (Toharudin, et .al, 2011)

Program of International Science Assessment (PISA) in 2006 and 2009, divides domains of scientific literacy into four major domains: science content, science process, the context of science applications, and attitudes (OECD, 2007; OECD, 2010). Among those four domains, attitudes domain is one which supports of scientific inquiry, self-confidence, interest in science and responsibility for resources and the environment (PISA 2007, PISA 2010).

Results of PISA assessment conducted since 2000 show the average score of Indonesian's students that is still far below the international average. For example, one of the PISA results in 2012 showed that the average value of Indonesian's students is 382 placing Indonesia in rank 64 out of 65 participating countries. In other words, Indonesia's students are the second lowest ranking of all PISA participating countries (OECD, 2014). Lack of scientific literacy of Indonesian's students indicates that science learning in Indonesia is still need improvement (El Islami, 2013).

Looking at these facts, it is necessary that innovations aim to to improve and enhance the quality of science learning is conducted such as through a learning model development.

Indonesian education department (Depdiknas, 2007) recommends that future science learning should lead to the development of self-confident character, attitudes, scientific skills, and science process skills. It is certainly in accordance with the four domains of scientific literacy as previously mentioned. In addition, the ability of learners in terms inquiry into other is important in the future of science learning so that research investigating the link between inquiry learning and scientific literacy is worth doing.

Guided inquiry learning is a learning approach which applies the concept of environmental conservation in integrated science learning. This approach to learning includes plenty of uses scientific approach to gaining knowledge. It is the basis of inquiry learning. The concept of environmental conservation according Hayat and Yusuf (2010) is considered to meet three basic principles of PISA content selection which include:

1. The concept of environmental conservation can be found in everyday life;
2. The concept of environmental conservation will still be relevant for at least the next decade; and
3. The concept must be related to the competence of the process ie knowledge not only maximizes students' memory and relates only to information

The concept of environmental conservation is one of the experimental concepts in the integrated science learning at Department of Science Education, University of Sultan Ageng Tirtayasa. This suggests that the competence of the process can be measured through practicum on the concept of environmental conservation (El Islami, 2013).

This study makes an observation in the area of Baduy village an area in the province of Banten which is popularly known for its well preserved environment. This well preserved environment could be seen from its forest, clean water, and environment. This leads to the use of local wisdom of Baduy's society in the learning process of integrated science associated with environmentally friendly natural arrangement.

Previous studies on science literacy, such as El Islami, et al (2015) correlate the science literacy and self-confidence finding that no significant correlation between science literacy and self-confidence. Similarly, Rahayuni (2016) conducted a study about relation of the science literacy and critical thinking skills. The result reported that there is a strong positive correlation between science literacy and critical thinking skills. In addition, research on science literacy is done by Rakhmawan, et al (2015) with a science literacy learning based inquiry on laboratory activities. The result of this study (showed) that the science literacy learning based inquiry is better than inquiry learning.

Research by El Islami, et al (2016) reported the effect of guided inquiry learning in increasing students 'science literacy. Although not significant statistically, the result of this study indicated that students' science literacy can be increased through the guided inquiry learning. An exploration to the existing studies on science literacy, there found no research focused on developing a guided inquiry learning model based on local wisdom of Baduy's society aims specifically to improve the scientific literacy of students related to environmental conservation.

To understand about scientific literacy and inquiry, PISA defined

scientific literacy as the capacity to use knowledge and scientific abilities, to identify questions and draw conclusions based on the evidence and the existing data in order to understand and help researchers to make decisions about the natural world and human interaction with nature (OECD, 2004). And Inquiry can be defined as a process to obtain data and information that can be done by observation or practicum activity to answer or solve the problem to a question or a problem formulation (Suyanti, 2010).

Suyanti (2010) and Sanjaya (2009) describes the general stages in inquiry learning strategy which consists of six stages :

1). Orientation;
2). Formulating Problems;
3). Formulating Hypotheses;
4). Collecting data;
5). Testing Hypothesis; and
6). Formulate conclusions

Gormally et. al. (2009) conducted a study on the effect of inquiry-based learning to scientific literacy and biology student's self-confidence. Based on his research, it is reported that inquiry-based learning can improve scientific literacy and student's self-confidence significantly, despite conventional class experience improved self-confidence better than the experimental class. Thus, inquiry learning strategy can be used to improve scientific literacy.

Local wisdom is the process of how knowledge is generated, stored, applied, and inherited (Alwasilah, 2009). Baduy's society has local wisdom in conservating them environment. It can be seen from the management of natural resources into three zones, namely *reuma* (settlement), *heuma* (moor and arable land), and *leuweung kolot* (old forest) (Suparmini, et al, 2013).

The forms of environmental conservation carried out by Baduy's society, among others include (1) agricultural systems, (2) knowledge systems, (3) technology systems, and (4) conservation practices. All of that is done by basing on the provisions of custom and "pikukuh" that have been embedded in the soul and done with full awareness by all of Baduy's society (Suparmini, et al, 2013).

The theme of environmental conservation is important themes related to human survival. Environmental conservation efforts can be done in various ways such as reforestation or afforestation bare garbage governance, or through environmental education. How to conservation of environment through education would be more effective than other ways. This is

because the results of the environmental education rooted in the mind and heart of a learners. For that, environmental conservation into the integrated science learning in Department of Science Education University of Sultan Ageng Tirtayasa.

METHOD

The method used in this study is Research & Development developed by Sugiyono (2009). The steps in this study are as follows:

1. Preliminary study was done before product development. This was conducted to see the potential and problems that occured,
2. Then, the data were collected to design the learning plan (RP) and Student Worksheet (LKM),
3. After the RP and LKM were made then validation was done by the learning expert,
4. Product test was conducted on 13 students majoring in science education and given pre-test and posttest of 13 students.
5. After obtaining pre-test and posttest data, revision of RP and LKM based on pretest and posttest was carried out.
6. This learning model was then implemented in the class. 15 students were given pretest, posttest and questionnaire and observation. The observation was conducted to see the improvement of students's scientific literacy through guided inquiry model based on local wisdom of Baduy's society.

The instrument used in this study is instrument of scientific literacy. The grating of scientific literacy instrument used is given in Table 1 below.

Table 1 Grid Instrument of Scientific Literacy

Domain of Literacy Science	Indicator
Content of Science	Nature of light The benefits of light The impact of artificial chemicals Nature of air Air circulation
Context of Science	Baduy House Position Use of natural chemicals Baduy tribe house form
Science Process	Identify scientific issues Explain the scientific phenomenon Using scientific evidence
Science Attitude	Responsibility Supports scientific inquiry

The object in this study is students who are following the integrated science learning in 5th semester which is the prospective science teacher. The number of students who become the object of study amounted to 31 students.

To see the improvement of scientific literacy of students before and after the application of guided inquiry learning based on local wisdom Baduy's society, quantitative data analysis was done through the calculation of

normalized gain calculated by formula of Meltzer (2002)

$$\text{N-Gain} = \frac{\text{Final score} - \text{initial score}}{\text{maximum score} - \text{initial power}} \quad (1)$$

The categorization of N-Gain score can be seen in Table 2 (Hake, 1998).

Table 2 Categorization of N-Gain score

N-Gain (g)	Category
$g < 0,30$	Low
$0,30 \leq g \leq 0,70$	Medium
$g > 0,70$	High

RESULT AND DISCUSSION

Learning outcomes measured in the four aspects of scientific literacy are; science content, the context of science applications, the process of science and attitude of science through pretest and posttest. The product scale test conducted obtained obtained both pre-test and post-test as presented in Table 3.

Table 3 Overall Learning Outcomes Product Trial

Domain	Pretest	Postest	N-Gain
Literacy Science	47.01	50.43	0.06
Content of Science	27.35	29.06	0.02
Context of Science	47.01	50.43	0.06
Science Process	11.11	15.38	0.05
Science Attitude	19.66	21.37	0.02

Based on the analysis of the data obtained, scientific literacy of students has improved in the medium category with value of N-Gain is 0.06 at low category (Hake, 1998). Then, the revised and consumption trials were conducted in order to obtain both pretest and posttest data as can be seen in Table 4.

Table 4 Recap Overall Learning Outcomes Product Trial

Domain	Pretest	Postest	N-Gain
Literacy Science	57.26	64.1	0.16
Content of Science	31.62	35.04	0.05
Context of Science	57.26	64.1	0.16
Science Process	15.38	16.24	0.01
Science Attitude	25.64	29.06	0.05

The improvement of scientific literacy using guided inquiry learning is relevant to a study as conducted Hastia (2012) which concludes that guided inquiry learning can improve the scientific literacy of junior high school students with N-Gain by 0,41(medium category). This finding is also in line with a study by Anwar (2012) concluding that guided inquiry learning which aided video media can improve the scientific literacy of students with N-Gain 0,52 (medium category). Another study conducted by Gormally et.al. (2009) showed that the inquiry-based learning can improve the scientific literacy of students and research as also reported in a similar study by Gormally and Hallar (2008).

CONCLUSION

There is the influence of guided inquiry learning model toward the improvement of students's scientific literacy in integrated science learning on environmental conservation concept based on local wisdom of Baduy's society

SUGGESTION

Need to study about guided inquiry learning model toward the improvement of students's scientific literacy on other concept of integrated science learning.

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