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Syntax of the Guided Inquiry Learning Model Based on Local Wisdom of Baduy's Society Towards Scientific Literacy on Environmental Conservation Theme

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Abstract

This research aimed to develop the syntax of guided inquiry learning based on the local wisdom of the Baduy's society, which is oriented towards student scientific literacy on environmental conservation. The method used is mixed-method with a sample in this study were 15 students. The syntax of guided inquiry learning in the implementation consists of six stages; orientation, presenting the problem, hypothesis submission, data collection, hypothesis testing, and conclusion formulation. In the orientation stage, students describe the context that comes from the local wisdom of the Baduy's society. In presenting the problem, students asked questions about the science content related to the context of the local wisdom of the Baduy's society, which was described earlier. In the hypothesis submission stage, the teacher asks students to submit hypotheses related to the previous questions. In the data collection stage, the teacher provides questions in the form of science content, scientific processes, and scientific attitudes to be answered by students that can be used to test hypotheses. In the hypothesis testing stage, students use the data that has been collected. In the conclusion formulation stage, students conclude the results of hypothesis testing using the data that has been collected. Implementing guided inquiry learning based on the local wisdom of the Baduy's society can improve scientific literacy (N-Gain = 0.064). So, we can use guided inquiry learning based on the local wisdom of the Baduy's society, which is oriented towards student scientific literacy on environmental conservation using six stages.
Keywords: Guided Inquiry Learning, Local Wisdom of the Baduy's Society, Scientific Literacy, Environmental Conservation

INTRODUCTION

The world views scientific literacy as an essential aspect of science and technology development. People can develop their scientific understanding with good scientific literacy (Yuenyong & Narjaikaew, 2009). Good scientific literacy skills will accelerate technological development to simplify problem-solving (Holbrook & Rannikmae, 2007). According to the Program of International Science Assessment PISA 2000 (OECD, 2001) and PISA 2003 (OECD, 2004), scientific literacy is divided into three major domains, namely science content, scientific process, and the context of science application (OECD, 2001; 2004), while

PISA 2006 (OECD, 2007) and PISA 2009 (OECD, 2010) developed a literacy domain. Science into four major domains: science content, scientific competence/process, science application context, and attitudes. Attitude domains in PISA 2006 and 2009 support scientific inquiry, self-confidence, interest in science, and a sense of responsibility towards resources and the environment (OECD, 2007; 2010). The importance of scientific literacy encourages various studies to be carried out to find the problems that cause the decline in students' scientific literacy skills in Indonesia. Many studies in science education related to scientific literacy have been carried out (Gormally et al., 2009; Holbrook & Rannikmae, 2009; El Islami et al., 2019). With so many studies, the resulting benefits also provide positive results for policies in the world of Natural Sciences education, especially in Indonesia.

The Ministry of National Education (2007) recommends that future science learning should develop a confident character. The following are things that are recommended, including; science learning must be able to foster students' self-confidence, namely making students convinced that they can learn science; the development of scientific attitudes and skills must be used as a learning goal in addition to developing a science theme; science learning must invite students to understand natural phenomena by increasing their reasoning abilities through investigative activities; science process skills must be developed through the science learning process. Future science learning will lead to the development of scientific understanding, science process skills, scientific attitudes, and scientific context. In other terms, we can summarize in words of scientific literacy. In addition, students' ability in scientific investigation, or inquiry, is another important thing in future science learning (Salter & Atkins, 2014). So, we feel the need to conduct research that can link inquiry learning with scientific literacy.

Guided inquiry learning is suitable to be applied to the theme of environmental conservation in integrated science courses, which uses a lot of scientific approaches to gain knowledge (Saefullah et al., 2017). This is the basis of inquiry learning itself. The theme that will be used in this research is the theme of environmental preservation. This is because the theme of environmental is seen as a context in PISA 2018 (OECD, 2019). As we know, the theme of environmental preservation is one of the themes in the Integrated Science course, which is experimental, so that process competence can be measured through the Integrated Science course practicum on the theme of environmental conservation.

We observed the Baduy village area, which is known to have good local wisdom in managing the environment. The local wisdom of the Baduy people in managing the environment can be seen in the forests that are maintained in their beauty, the water sources are still clear and clean, and the environment is free from waste. The local wisdom of the

Baduy' society can be raised in the learning process of Integrated Science courses associated with environmentally friendly natural arrangements. So, we are interested in developing a guided inquiry learning model based on the local wisdom of the Baduy's society to improve the scientific literacy skills of science students related to environmental conservation. In addition, this study aims to develop science literacy-based lectures in the science education environment at the Sultan Ageng Tirtayasa University.

METHOD

We used a mixed-method with an embedded design as a research design. This study's priority is the quantitative and qualitative data to support the quantitative data (Creswell & Plano Clark, 2007). Sample in this study were 15 students. The instruments used in this study were scientific literacy test instruments in the form of multiple-choice, interview guidelines, questionnaires, and observation sheets which were validated by an expert validator.

RESULTS AND DISCUSSION

Several things have been done to develop the syntax of a guided inquiry learning model based on the local wisdom of the Baduy's society to improve students' scientific literacy on the theme of environmental conservation. First, a preliminary study was conducted on the local wisdom of the Baduy's society, the suitability of the theme in the Integrated Natural Sciences Court I with the local wisdom of the Baduy's society, and the problems faced regarding scientific literacy. Then a Lesson Plan and Student Worksheets based on the local wisdom of the Baduy's society were developed by incorporating aspects of scientific literacy in the form of science content, the context of science application, and scientific processes, and scientific attitudes. After the Student Worksheets and Lesson Plan have been compiled, they are validated by an expert who revises the product before testing it on a small scale.

The syntax of the guided inquiry learning model based on the local wisdom of the Baduy's society to improve students' scientific literacy on the theme of environmental conservation is shown in Table 1. Six meetings were held consisting of pretest product trials using three contexts of local wisdom of the Baduy's society, namely water management of the Baduy' society, sanitation in Baduy's houses, and Baduy's organic waste management, product trial posttest, usage trial pretest, usage trial using three contexts of Baduy's local wisdom, namely Baduy's water management, sanitation in Baduy's houses, and waste management organic of Baduy society, and posttest.

Table 1. The syntax of the guided inquiry learning model is based on the local wisdom of the Baduy's society

The stages	Descriptions
Orientation	Students describe the context that comes from the local wisdom of the Baduy's society
Presenting the problem	The teacher asks questions about the content of science related to the context of the local wisdom of the Baduy's society described earlier
hypothesis submission	The teacher asks students to submit hypotheses related to the questions given previously
Data collection stage	The teacher gives questions in the form of science content, scientific processes, and scientific attitudes to be answered by students that can be used to test hypotheses
Hypothesis testing	Students test the hypothesis using the data that has been collected
Conclusion formulation	Students conclude the results of hypothesis testing using the data that has been collected.

At the product trial stage, 13 students majoring in science education at a public university in Indonesia. The results of the product trial showed an increase in scientific literacy with an average N-Gain of 0.06 (low category), with an average N-Gain of each aspect: science content = 0.02 (low category); science application context = 0.06 (low category); science process = 0.04 (low category); and science attitude = 0.02 (low category). Furthermore, a design revision was carried out by looking at these results. After being revised, a trial for use was carried out on 15 students in the science education department at a public university in Indonesia. The results of the use trial showed an increase in scientific literacy with an average N-Gain of 0.16 (low category), with an average N-Gain of each aspect: science content = 0.05 (low category); science application context = 0.16 (low category); science process = 0.01 (low category); and science attitude = 0.46 (low category).

Based on the data obtained, the N-Gain from use trial step is greater than in the product trial. This is because the use trial step thas been improved according to the product trial results, and the group selection is heterogeneous. On the other hand, when the product was tested, the distribution of the group was not yet heterogeneous. Thus, the syntax of the guided inquiry learning model is based on the local wisdom of the Baduy's to improve students' scientific literacy on the theme of environmental conservation can improve scientific literacy. It is in line with It is in line with Gunawan et al. (2021) that blended learning with a guided inquiry model in the magnetic matter can improve the scientific literacy of junior high school students. In addition, Wen et al. (2020) also found that the students with middle-level science achievement demonstrated the most active engagement in inquiry and showed good gains in scientific literacy after the learning.

CONCLUSION

Implementation of guided inquiry learning based on local wisdom of the Baduy's society can improve scientific literacy (N-Gain = 0.064). The syntax of guided inquiry learning in the implementation consists of six stages; orientation, presenting the problem, hypothesis submission, data collection, hypothesis testing, and conclusion formulation. In the orientation stage, students describe the context that comes from the local wisdom of the Baduy's society. In presenting the problem, students asked questions about the science content related to the context of the local wisdom of the Baduy's society, which was described earlier. In the hypothesis submission stage, the teacher asks students to submit hypotheses related to the previous questions. In the data collection stage, the teacher provides questions in the form of science content, scientific processes, and scientific attitudes to be answered by students that can be used to test hypotheses. In the hypothesis testing stage, students use the data that has been collected. In the conclusion formulation stage, students conclude the results of hypothesis testing using the data that has been collected.

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