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The Effectiveness of Project Based Learning Model Based on Local Wisdom Plantae Material To Improve Students' Science Literacy Ability

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Abstract

Scientific literacy is an ability that students must have in facing the challenges of the 21st century and is also one of the objectives of implementing the 2013 Curriculum. The object of this research is the basic competencies of Plantae material which is taught using project based learning (PjBL) based on local wisdom. This study aims to analyze the effectiveness of project-based learning (PjBL) based on local wisdom to train students' scientific literacy skills. This research was conducted in class X MA NU Miftahul Falah Dawe Kudus, the sample of this study was taken by using saturated sampling technique. This research design using One Group Pretest Posstest Design. The data was collected using test with indicators of scientific literacy competence. The test results were analyzed using the N-gain test and paired sample t-test to prove the effectiveness of the learning. The results showed that the level of learning effectiveness was moderate with the average of N-Gain 0.66. The results of the paired sample t-test obtained a value of sig. 0.0000 $<\alpha = 0.05$, which means that there is a significant difference between the pretest and posttest mean values. Based on the research results it can be denied that the project-based learning based on local wisdom of the Plantae material is effective to train students' scientific literacy competencies

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INTRODUCTION

The development of the 21st century is a new challenge in the world of education. This is due to the rapid development of all sectors of life such as the economy, transportation, technology, and others. 21st century skills consist of four main domains, namely literacy, inventive thinking, effective communication, and high productivity, so that several countries define scientific literacy as an educational goal (Rusilowati, 2018).

Scientific literacy is the ability to apply scientific knowledge in identifying and solving problems, drawing conclusions based on scientific evidence to understand and make decisions related to nature and the changes that occur in it through human activities (OECD, 2003). Scientific literacy is needed to understand science issues, risks, benefits of science, understanding science, including its relationship to culture (Fasasi, 2017).

The low level of scientific literacy is influenced by several factors including the media, models, facilities and infrastructure, teaching staff, and the school learning curriculum. Besides external factors such as attitudes, interests, motivation, attitudes, beliefs, and self-confidence of students. In addition, the affective component also plays an important role in the decision-making process of students in solving problems (Chonkaew et al., 2016; Hartati, 2016). Positive attitudes towards science have an effect on students' academic potential (Sumarni et al., 2018)

Biology is the study of science that occurs in real life including interactions between living things and the environment. Biology learning focuses on the study of biological context phenomena as a whole and meaningfully involving the role of technology and its application in producing product innovations that can be utilized by the wider community (Rustaman, 2017).

The results of observations obtained data that the cause of low student scientific literacy was due to the learning process emphasizing the aspects of memorization and lack of training in students' ability to analyze, identify and solve problems, draw conclusions based on scientific evidence.

The 2013 curriculum focuses on learning with a scientific approach. The scientific approach recommended in the 2013 curriculum is project-based learning. The project based learning (PjBL) model is an innovative approach model that involves project work and guides students to design, solve problems, and provide opportunities to work independently (Putra & Basuki, 2018). PjBL is a learning model that provides direct and real experiences as students' understanding of theories and concepts (Sababha et al. 2016). The PjBL learning model is one of the most researched scientific learning models and is effective in improving scientific literacy (Afriana, et al. 2015, 2016).

Plantae material (plants) is a class X material that is contextual and involves a lot of the environment related to the phenomena of everyday life. Many communities around Dawe Kudus use local plants that are believed to have health benefits, for example parijoto is believed to be able to keep the mother and fetus healthy and the surrounding community recommends eating parijoto in the first trimester of pregnancy, young fern leaves are used as pecel/ vegetables believed to reduce heat, various types of white pomegranate, red pomegranate, and white pomegranate can cure diarrhea, grapefruit can cure mouth sores, fennel leaves are believed to be worm medicine and so on. According to Widjonarko (2008); Wibowo (2012) states that there is little information regarding the use and potential of local plants. Utilization of these local plants is still limited to direct selling or simple cooking, but there is no other product processing that is more innovative.

Local wisdom can serve as a learning stimulus for motivation and help students to construct their knowledge (Sumarni, 2018). The integration of local wisdom in science learning is stated by Nieto & Ling (2010), that the integration of local wisdom in various professions is a determinant of the meaning of professional services and educational services. The integration of local wisdom in science learning is in line with the constructivism theory put forward by Vygotsky regarding the importance of local wisdom in education. Local wisdom in learning is able to develop thinking skills and inculcate character values based on local wisdom. Sudarmin et al, (2014) suggest the application of local wisdom as a national identitY.

The purpose of this study was to determine the effectiveness of the PjBL learning model based

on local wisdom to train students' scientific literacy skills at Dawe Kudus.

METHODS

This Research was conducted using a quantitative research approach one group pretest posttest design.

Pretest	Treatmen	Posstest
O_1	X	O_2

Figure 1. Research Design One Group Pretest Posstest Design

This research was conducted by MA NU Miftahul Falah Dawe Kudus in the odd semester of the 2019/2020 school year. The population in this study were all class X MA NU Miftahul Falah Dawe Kudus. The sample in this study was taken with a saturated sampling technique involving all the population in class X MIPA.

The data collection instrument used was in the form of test questions. The data analysis technique was the t-test which was used to determine the effectiveness of the PjBL learning model based on local wisdom to increase students' scientific literacy skills. The pretest posttest data were analyzed using N-gain. N-gain used to analyze achievements and before and after learning

RESULTS AND DISCUSSION

The learning outcomes data of the PjBL model are based on local wisdom of plantae material to improve scientific literacy competencies. The value of scientific literacy competence is obtained based on the pretest and posttest values, then the N-gain test is carried out. The mean results of the scientific literacy competency test were compared using the t-test (paired sample t test) and calculated using the N-gain. The N-gain table test aims to determine the increase in the competence of scientific literacy.

Based on Table 1, the results showed that the pretest mean of science literacy competence in PjBL learning based on local keraifan was 37.85 with moderate criteria. While the mean of the posttest results about scientific literacy competency is 79.5 with high criteria. While the N-gain result is 0.66 in the medium category. The criteria are being influenced by internal factors in the form of students not being used to working on scientific literacy questions based on local wisdom of Dawe Kudus plants, so students need more time in the process of understanding scientific literacy questions.

Table 1. Increasing students' Science Literacy Competence with N-Gain

Class	Mean pretest	Mean *posttest*	*N-Gain* class	Criteria
X MIPA A	37.4	80	0.67	Moderat
X MIPA B	38.3	79	0.65	Moderat
Rata-rata	37.85	79.5	0.66	Moderat

Table 2. Results of the Analysis of Science Literacy Competency Questions

Indicator	X MIPA A	X MIPA B	Mean
Explain phenomena scientifically	75.4	75.71	76.42
Evaluate and plan scientific investigations	75.9	74.17	75.03
Interpret data and evidence scientifically	80	79	79.5

Learning is expected to be able to build science process skills which is part of scientific literacy to encourage students' enthusiasm to solve problems. The project-based learning model is a scientific approach that has been widely researched and is effective in increasing scientific literacy (Ariana et al., 2015, 2016).

Based on the data in Table 2. analysis of every aspect of scientific literacy competence, namely, explaining scientific phenomena, evaluating, and designing scientific investigations, and interpreting scientific data and evidence. The scientific literacy competence of students explaining scientific phenomena has a high category, with three indicators, namely 1) applying appropriate scientific knowledge; 2) explain the potential implications of the application of public

science knowledge, and 3) make and justify correct predictions.

Student involvement in learning activities makes it easier for students to remember, identify, apply, explain, and conclude related to scientific phenomena that occur in the environment around Sari et.al (2017). The ability to evaluate and design scientific investigations has good criteria that are measured by using indicators 1) distinguishing between the questions investigated scientifically; 2) identify ways to explore investigable questions, and 3) evaluate scientific questions. Questions on literacy questions connect the cognitive aspects of students with phenomena commonly encountered in everyday life. The ability of students to identify scientific questions depends on the many levels of cognitive aspects contained in memory (Nisa & Sudarmin, 2015).

Local wisdom based PjBL learning requires students to organize and build student knowledge independently through observation, investigation, and discussion of factual problems through relevant reading references according to everyday life. The socio-cultural environment needs to get serious in developing science education because it is buried in original science that is useful for people's lives (Suastra et al., 2011). The stages of asking questions and gathering information in scientific learning will encourage students' scientific literacy skills. Students are not familiar with the ability to interpret data and evidence so that the average acquisition analysis obtained is not much different from the previous indicators.

PjBL learning based on local wisdom of plantae material requires students to investigate original science and scientific science, both individually and in groups. Tasiwan (2014) states that project learning can improve skills in interpreting data, classifying, drawing conclusions, and communicating. Learning by utilizing phenomena that exist in society in a cultural context can develop critical thinking skills (Asih et.al 2018). Project-based learning provides opportunities for teachers and students to develop curiosity in the context of science (curiosity) to encourage students to study material further by evaluating and interpreting information (Sari et al., 2017; Astuti et al., 2017; Lutfi et al., 2018). Science literacy competencies interpret data and evidence on the concept of new plantae material to the content ability to recognize basic facts, students have difficulty communicating and relating to various science topics. This is because biology learning only focuses on memorization concepts, theories, and laws. In the end, students experienced difficulties in applying knowledge in answering evaluation questions based on local plant wisdom to train students' scientific literacy skills. The results of research by Rahayu et al. (2006) on the effectiveness of local culture-based learning gives better results because learning takes place more meaningfully for students.

CONCLUSION

The conclusion from the results of this study is that the PjBL learning model based on local wisdom of the Plantae material is effective for training students' scientific literacy skills

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