Implementation of Ethnoscience-based Guided Inquiry Learning on The Scientific Literacy and The Character of Elementary School Students

Alim[1✉] , Sarwi[2] & Bambang Subali[2]

[1] Universitas Kristen Satya Wacana, Salatiga, Jawa Tengah, Indonesia
[2] Universitas Negeri Semarang, Indonesia

Article Info

Abstract

Building literacy education and students character in the 21st century began to be developed specifically in schools. The development of character education and the improvement of mastery literacy can be done by habituation and ethnoscience-based guided inquiry learning. The purpose of this study was to learn the implementation of ethnoscience-based guided inquiry learning on the literature and students character. The place of this research is at SDN 2 Wonosobo and SDN 5 Wonosobo, Wonosobo Regency. The type of research is a mixed method, with embedded experimental design. The sample in this study amounted to 56 students, for qualitative data samples, three samples were selected which obtained poor pretest (SP-1), moderate (SP-2), and high (SP-3) values. Data collection is done by test, observation, and documentation methods. The results of this study show a significant effect on the implementation of ethnoscience-based guided inquiry learning and the mastery of students literacy. This can be seen from the significance value of p (asymp. Sig. 2 tailed) of 0,000. The character development of students varied enough from SP-1, SP-2, and SP-3, and showed better development from each meeting. The conclusion in this study shows that ethnoscience-based guided inquiry learning gives a significant influence on the mastery of scientific literacy and the student's character.

✉ Correspondence address:
Diponegoro No.52-60, Salatiga, Sidorejo,
Salatiga, Jawa Tengah, 50711
E-mail: alimhusna26@gmail.com

INTRODUCTION

The world community is entering a new era, the era of accelerating change in various aspects or fields including education. Scientific literacy becomes very important for students to have as a provision to face the challenges of the development of the 21st century. Scientific literacy is directly correlated to build a new generation that has strong scientific thoughts and attitudes and can communicate knowledge effectively.

The main objective of learning science is to build students' scientific literacy that is about understanding the principles of science and how these principles can be developed. Rubba, and Harkness (1993) states that the characteristics of individuals who have scientific literacy are: (1) have a positive attitude towards science, (2) able to use the science process, (3) have knowledge of the concepts and principles of science, and can apply them in technology and society; (4) have an understanding of the relationship between science, technology, society, and human values.

The results of scientific literacy tests obtained by Indonesian participants from PISA was 382 points in 2012 and 403 points in 2015 (OECD, 2016). The results show that Indonesian literacy abilities have increased from the previous year, so it is necessary to instill positive values that encourage knowledge, awareness, willingness and take action to improve the scientific literacy of students approaching or even exceeding the international average of 493. These results indicate that the ability of Indonesian students to be literate towards science and technology is still very necessary to be fostered; similarly, the ability to do research. The ability to do research will affect the ability to get discoveries and solving problems, also affect the scientific attitude of learners which impact on the formation of character.

Current character education indeed becomes part of the process of moral formation of children; even this character education is expected to be the main foundation for the nation. Law No. 20 of 2003 on National Education System clause 3, stated that national education functions to develop capabilities and dignified national character and civilization to educate the life of the nation. Character education develops with deliberate efforts to optimize students' ethical behavior. The results of character education are always encouraging, solid, and continue to prepare future leaders (Agboola, and Tsai, 2012). In line with the idea, Rasyid, and Mansyur (2007) stated that a child who has a positive attitude and character in the study would get success in learning.

Akbar (2000) said that one's success is not determined solely by knowledge and technical abilities (hard skill) only, but more by the ability to manage themselves and soft skill. This suggests that the character education of students is very important to be developed and improved, especially in formal education. This is in accordance with Sadia, Arnyana, and Muderawan (2013) research and Azhary, Handoyo, and Khafid (2018) which stated that the implementation of character education through the school pillars is based on three important reasons, namely: (1) The need for good character to be a complete part of human beings. Every human being must have a strong mind, conscience, and willingness to be qualified as having honesty, empathy, attention, self-discipline, perseverance, and moral encouragement; (2) School is a good and conducive place to carry out the learning and education processes of values; and (3) Character education is essential to building a moral society.

Instill wisdom from the diversity of values and culture of community life is a way to start the implementation of character education in schools. The development of local wisdom-based science learning design can develop positive character and learning achievement in elementary schools (Subali, Sopyan, and Ellianawati, 2015). Local wisdom owned by the Indonesian people has the role to build national character, such as cooperation, religion, tolerance, and so on. It has the potential value to be included in Curriculum 2013 because of the characteristics of diverse regions in various aspects such as the economy, culture,

information technology, and communication, etc.

The local wisdom-based education model (ethnoscience) is an example of an education that has high relevance for life development skills, based on empowering local skills and potential in each region. In line with the results of Atmojo research (2012), Damayanti, Rusilowati, and Linuwih (2017); Dewi, Suryadarma, Wilujeng, and Wahyuningsih (2017); Pamungkas, Subali, and Linuwih (2017) there was an increase in student learning outcomes in science learning with an ethno sains approach, this was caused by science learning by using the agnostic approach of students more interested, enthusiastic, and happy. By the research conducted by Widiyatmoko, Sudarmin, and Khusniati (2015) from the data analysis the study shows that students learning by using ethnoscience based learning resources can build a character of loving students.

Learning that is organized in a system of knowledge from the culture and local wisdom that is owned, related to certain natural phenomena and events is called ethnoscience (Shidiq, 2016). Ethnoscience based learning that does not separate between cultural science and local wisdom, as well as society, can be used as a learning approach. With ethnoscience students do not view science as a foreign culture they learn but are seen as part of existing local culture and wisdom.

The nature of learning science such as attitudes, processes, and applications in elementary school has not been touched. Participants are given the material science students only in the form of facts, principles, theories, and laws without going through disclosure-based learning or discovery. Research conducted by Rizal (2014) and Aminah, Rusilowati, and Lestari (2014) Inquiry learning process provides an opportunity for learners to have a real learning experience and actives until learners are trained to solve problems and make decisions. This is in line with what was stated by Wolf, and Fraser (2008) that the use of inquiry-based learning models could encourage student motivation and improve academic achievement.

Observation in Public Elementary Schools in Kota Districts Wonosobo found that learning that is done only activates the teacher, is less attractive, and students tend to be less active. The learning method used is only lectures and demonstrations so that students are less able to explore their knowledge from other learning sources. The teacher has not made ethnoscience-based learning (i.e. outdoor learning) so that students do not know the culture of their region because there are no teachers integrate creativity in learning. Learning is rarely done with a guided inquiry model. Learning will be meaningful if there is an interaction between students and students, students with teachers and learning resources in a learning environment so that it is expected to build a positive character of students. Based on the problems above, the teacher should be able to implement ethnoscience based guided inquiry learning (i.e. outdoor learning).

METHODS

This research uses mixed methods (combined research) with the embedded experimental model design. It is wrapped up the basic mixed method design in an experiment (Creswell, 2015).

Figure 1 explained that the design was done in 4 stages. The first stage is the stage before the intervention in the form of needs analysis which is a source of quantitative data. At this stage of the needs analysis, initial observations and interviews were conducted to identify the learning carried out in the school. The second stage is the stage of the intervention, which is to test the instrument on a limited basis to students in small groups.
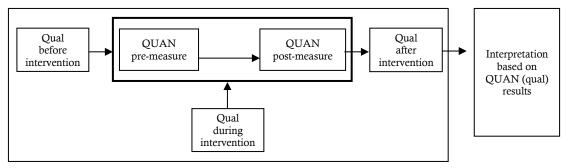
Figure 1. Embedded Experimental Model Design

The third stage is analyzing the data obtained through the character of students. While the qualitative data is an observation sheet for the implementation of ethnoscience-based guided inquiry learning The fourth stage is the stage of interpretation of quantitative data and qualitative data used to discuss the results of the research and make conclusions. The research design used is Pre-test – Post-test Control Group Design where researchers can find out the influence by comparing the character of students who appear before and after the treatment.

The population in this study was all elementary school students in Kota Subdistrict because in the subdistrict there were the most Carica in syrup home industry (Carica in syrup) compared to other sub-districts in Wonosobo. Samples from this study were 27 students of fifth grade from SDN 2 Wonosobo, and 29 students of SDN 5 Wonosobo. The technique used is purposive sampling. Three samples were selected which obtained poor pretest (SP-1), moderate (SP-2), and high (SP-3) values.

There are three stages in this study, namely the stages of planning, implementation, and conclusion or data analysis. Data collection is a systematic procedure and a standard for obtaining the required data. Determination of data collection instruments for research is based on the problems to be studied. The instrument used in this study consisted of three types of instruments, namely test, observation, and documentation.

Qualitative data analysis techniques include data reduction, data presentation, conclusion drawing, and verification. Data reduction is obtained from the result; documentation is reduced by summarizing, selecting, and focusing on the data by the purpose of research. Data presentation is done after the data has been reduced. Data obtained from the results, documentation is presented in the form of narrative descriptions, tables, figures, flowcharts, and so forth, data that has been reduced and presented, then used by researchers to make conclusions.

RESULTS AND DISCUSSION
Scientific Literacy

Results of scientific literacy are obtained from multiple-choice tests reasoned that given to students in fifth grade after getting ethnoscience-based guided inquiry learning. The tests were conducted to determine the difference in scientific literacy, conducted by Wilcoxon and test N-Gain. The Wilcoxon test is used to determine the difference between two ordinal scale/interval groups. For the Wilcoxon Test results, experimental class can be seen in Table 1.

Table 1. Experimental Class Wilcoxon Test Results

	Post-test – pre-test
Z	-4.688
Asymp. Sig. (2 tailed)	.000

a. Wilcoxon Signed Rank Test
b. Based on Negative Rank

Based on Table 1 the results of the calculation of the Wilcoxon Signed Rank Test, then the value of Z obtained is -4.688 with p-value (asymp. Sig. 2 tailed) of 0.000 which is less than the critical research limit of 0.05, H_0 is rejected, and H_a accepted, which means that there is a significant difference between the pretest and posttest scores of scientific literacy after the

application of learning by using an ethnoscience-based guided inquiry model.

Here the figure which showed an increase in the mastery of Scientific literacy learners. The increase of N- Gain can be seen in Figure 2.
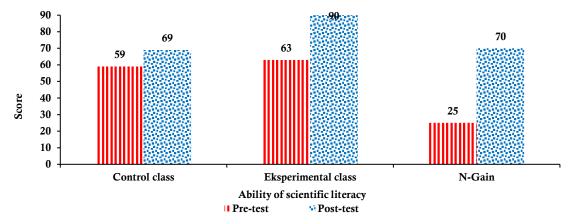

Figure 2. Students' Scientific literacy

Based on the data in Figure 2, it can be seen that each grade has increased the ability of scientific literacy, experiment class is at the high category, while the control class is the poor category. This proves that ethnoscience-based guided inquiry learning influences in enhancing students' mastery of scientific literacy. Yuniastuti (2013) says learning using guided inquiry strategies can improve students' process skills which consecutively have an impact on learning completeness.

Scientific literacy is the starting point for students to know the readiness of students to face challenges in society. Scientific literacy can be a benchmark for determining the Poor scientific literacy skills can be improved by proper handling, for example by paying attention to the characteristics and potential of students, developing appropriate teaching materials, developing appropriate instruments, managing good learning activities, and strategies and learning models needed (Widodo, and Inzanah, 2014; Safitri, Erman., and Admoko, 2016). This opinion is by what was expressed by Jagger, and Yore (2017); Hidayani, Rusilowati, and Masturi (2016) that mastery of Scientific literacy can be improved by providing and guiding students to explore references, books as learning resources, and habituating literacy education.

Student Character

Efforts to establish the character according to the nation's culture is certainly not solely carried out at the school through a series of learning activities and out of school, but also through habituation in life, such as inspiring, humane, social care, innovative, creative, integrity, environmental care. Rianafik, Raharjo, and Wasino (2017); Temiz (2016) state that strategies developed to develop character are habituation, modeling, and motivational administration. Therefore, schools play a large role in the development of character education because the role of schools is as a center of civilization through the approach of developing school culture. According to Saputra, Rusilowati, and Sarwi (2018) students character can be seen during the learning process.

Student character data is obtained through observation. Observers made observations in the experimental class during three meetings. Character observation of students is done classically by observers. The results were analyzed based on the number of scores of each last statement determined by the average of each aspect then described descriptively.

Choice 1 students (SP-1) are students from the experimental class who get the poorest score on the initial test. The results obtained by SP-1 in

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the observation of student characters from the first to the third meeting can be seen in Figure 3.
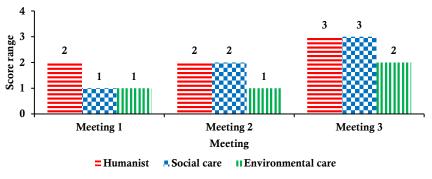

Figure 3. SP-1 Character Analysis

From Figure 3 above the character that appears in SP-1 is a humanist, social care, and environmental care. The humanist indicator consists of three indicators, but that tends to emerge that restraint against self-interest and socially. Scores obtained on humanist characters tend to increase from meeting 1 to meeting 3. For social care, indicators consist of two indicators, namely doing work with other people, alleviating the burden and or help solve other problems. From the social care indicators that appear, the average of each meeting is taken. The scores presented in the figure for these indicators tend to increase. As for the character of environmental care is composed of two indicators: take environmental regulation and keep the beauty of environmental, throw garbage properly and in order. Scores for environmental care characters tend to increase with the presence of ethnoscience-based outdoor learning.

Choice 2 students (SP-2) are students from the experimental class who obtain the middle mean score on the initial test. The results obtained by SP-2 in observing student characters from the first to the third meeting can be seen in Figure 4.
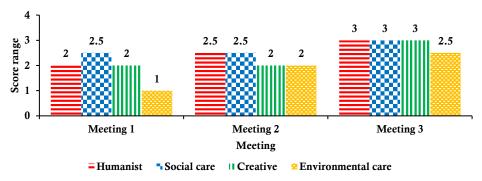

Figure 4. SP-2 Character Analysis

From Figure 4 above the character that appears in SP-2 is a humanist, social care, creative, and environmental care. Indicators humanists tend to emerge that full restraint against self-interest and socially because ethnoscience-based guided inquiry requires students to study in groups. Scores obtained on humanist characters tend to increase from meeting 1 to meeting 3. The social caring character indicators on SP-2 tend to be good. Indicators creative characters appear, doing tasks or problems with their original ideas, doing task in a manner that varies. This creative indicator is seen when students work on tasks given both individual assignments and group assignments. SP-2's creative character develops better. As in

the research of Fathoni, Isnarto, and Haryani (2018), inquiry model learning can stimulate and develop creative abilities in learning.

The environmental care indicator which initially scored 1 for the average at the first meeting, tended to increase for the next meeting because at the next meeting students had already been introduced to learning resources in the environment and interacted directly in gathering information in groups so that the character caring for this environment develops well.

Choice 3 students (SP-3) are students from the experimental class who get the highest score on the initial test. The results obtained by SP-3 in observing the character of students from the first to the third meeting can be seen in Figure 5.

Figure 5 the characters that appear in SP-3 are inspirational, humanistic, social care, creative, and environmental care. Indicators on the inspirational character, have oral ideas to do a positive act, do good work because that have many benefits. Inspiring characters in SP-3 tend to develop well because both inspirational indicators emerge and are useful for inspiring other students to do their assignments.

Humanist indicators on SP-3 emerged and developed well; even the scores obtained tended to increase from each meeting. The social caring character is seen by the emergence of social care indicators; SP-3s are very happy to work in groups and like to help friends in groups who do not understand their duties. For creative characters, it also develops well with the emergence of creative indicators which tend to increase from each meeting. SP-3 can do assignments varied, and complete tasks with their ideas. Whereas for environmental care indicators which initially scored 1 for the average at the first meeting, they tended to increase for the next meeting because at the next meeting students had already been introduced to learning resources in the environment, and outdoor learning explored information in groups. So that the character caring for this environment develops well.
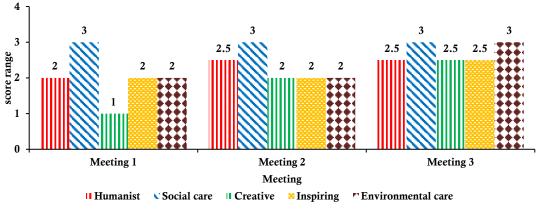

Figure 5. SP-3 Character Analysis

CONCLUSION

Results of this research are the influence of ethnoscience-based guided inquiry learning to the mastery of Scientific literacy and students characters.

The increase in mastery of experimental class on scientific literacy was higher than that of compared to the control class, which is 69 and 90 respectively. The difference in the value of mastery of scientific literacy is because the experimental class is more active in seeking knowledge than the control class so that it is better to deduce the knowledge gained. By comparing the difference in N-Gain values between the control class and the experimental class which are 0.25 and 0.70, it can be concluded that the increase in the mastery of scientific literacy values obtained by the experimental class is higher than the control class.

There is a significant influence of ethnoscience-based guided inquiry learning on students positive character. SP-1 character was a humanist, social care, and environmental care.

SP-2 characters are humanist, social care, creative, and environmental care. SP-3 characters are inspirational, humanistic, social care, creative, and environmental care. All characters that appear well in SP-1, SP-2, SP-3 are well developed which is marked by an increase in the score on the figures 3, 4, and 5 presented. Based on these results it can be concluded that ethnoscience-based guided inquiry learning affects students positive character.

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