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by

Submission date: 17-Sep-2020 01:37PM (UTC+0700)

Submission ID: 1389274770

File name: B.2._JPCS_Upincase.pdf (729.88K)

Word count: 3183

Character count: 18072

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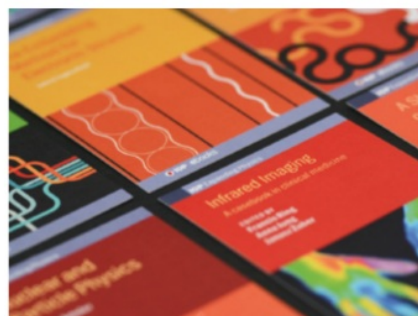
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To cite this article: Setyo Eko Atmojo *et al* 2019 *J. Phys.: Conf. Ser.* **1254** 012033

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Science Learning Integrated Ethnoscience to Increase Scientific Literacy and Scientific Character

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Abstract. This study aims to improve the scientific literacy and scientific character of students of prospective primary school teachers through science learning integrated ethnoscience. This research is an experimental study for students in class A1 and A2 of the PGSD UPY study program. Class A1 is an experimental class that implements science learning integrated ethnoscience and class A2 as a control that implements conventional learning. This type of research data consists of scientific literacy data and student scientific characters. Scientific literacy data was collected using tests and analyzed using N-gain, while scientific character data were collected using observation sheets and analyzed by descriptive percentages. The results of the study show that science learning integrated ethnoscience can improve students' scientific literacy with a gain score of 0.81 which is included in the high category. The average score of students' scientific character in science learning integrated ethnoscience is in the high category, where the average score of scientific characters in each aspect at each meeting is > 70%.

1. Introduction

Nowadays, learning activities at school have tended to develop intellectual aspects with only information from textbooks and teachers being the main learning resource. Based on observations made this fact is a general description of what happened in the schools in Bantul Regency, Yogyakarta Special Region. People consider the formal education process to be separate from the acculturation process and separate from the context of a cultural community. In addition, many people who view the learning process in school have a higher place (social prestige), than the local cultural traditions that are meaningless and lower (discreditation). At present, many people make local culture as their profession. Local culture as a profession can be expressed as part of the culture, because according to [15] culture is a way of life that develops, owned and shared by a group of people and passed down from generation to generation. But the way of life or culture of this society is less able to foster positive scientific character in the hearts of students. The lack of students' scientific character is because students have not known that in the local culture there are scientific principles.

During this time, they considered that the culture was acquired from generation to generation, and had no relation to learning activities at school or in college. To explain activities in a society's culture scientifically so that students can foster scientific character in students through local culture and



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improve scientific literacy in science learning. Based on these problems, integrated science learning ethnosience [3] thought to be a solution to overcome this problem because integrated science ethnosience is a strategy for creating learning environments and designing learning experiences that integrate culture as a part of the learning process [3]. Science learning integrated ethnosience based on constructivism views that prioritize the creation of meaning. Science learning integrated ethnosience emphasizes the importance of learning using environmental and cultural concepts, especially local culture as a learning resource so that learning outcomes are more meaningful for students [11]. Meaningful learning is learning that is packaged according to the characteristics of students. This is relevant to the objectives of science learning which is oriented towards mastering knowledge, skills, values and attitudes so that the students are able to participate in the environment actively.

Today, education and culture are two things that complement each other. Culture can be part of the education process if it is integrated into the learning process. Culture integration in learning activities is often known as the term culture-based learning or ethnosciences. This culture-based learning or ethnosience has various benefits. In some previous studies, this ethnosience-based learning has been known to improve science process skills and student appreciation of the developing local culture [1]. Researches related to ethnosience have been carried out both at elementary, secondary to tertiary level, but the results of these studies only reveal changes in terms of the link between the concepts of science and local culture, achievement, science process skills, and appreciation and perception of local culture [14]. There have not been studies and in-depth studies on integrating local culture in universities that reveal scientific literacy and scientific character. Based on various previous research studies, this research aims to integrate culture in science learning to improve scientific literacy and scientific character in universities. This integration is carried out on students of PGSD study program at Yogyakarta PGRI University in the course of Natural Sciences 1.

2. Method

This research is experimental research with the subject of the study are students of PGSD Yogyakarta PGRI University class A1 and A2 class of 2017 who take courses in Natural Sciences 1. Whereas A1 Class is an experimental class that uses integrated learning ethnics and A2 class is a control class. Types, techniques and instruments of research data collection can be seen in Table 1.

Table 1. Types, Techniques, Instruments and data analysis

Table 1. Types, Technique, Instrument and Data Analysis

Data Type	Data Collection Technique	Instrument	Data Analysis Technique
Scientific Literacy	Test	Question Test	N-gain
Scientific Character	Observation	Observation Sheet	Deskriptive Percentage

3. Results and Discussions

Science learning integrated ethnosience activities has the characteristics of integrating local culture that develops in the community into classroom learning activities. In this research, the local culture integrated is 'batik' culture with the type of 'jumputan batik' (dye tie). This type of 'batik' is found in many tourist village areas in Bantul Regency, Yogyakarta. This type of batik activity has been studied before and concluded that it contains elements of science [2]. After the implementation of ethnosience integrated science learning in the class obtained the results of scientific literacy improvement as in Table 2.

Table 2. Student Literacy Scientific Improvement

Class	Before the Learning Process	After Learning Process	Gain	N-gain	Criteria
A1 (Experiment)	54.47	91.36	36.89	0.81	High
A2 (Control)	54.23	61.52	7.29	0.15	Low

Based on Table 2, it is recognized that there is a high increase in scientific literacy in the experimental class and a low increase in the control class. This difference in scientific literacy

increases because the experimental class uses science learning that integrates ethnics. In addition to improving scientific literacy, the implementation of science learning integrated ethnoscience is also able to improve students' scientific character. Based on the results of data analysis that has been done, it is known that each percentage aspect of the scientific character is known to be present in students during integrated science learning ethnics. The percentage of scientific characters in students can be seen in Table 3.

Table 3. Percentage of Student's Character Scientific on Each Aspect

No	Student's Character Scientific	Student's Character Scientific Aspect	1st Meeting %	2nd Meeting %	3rd Meeting %	4 Meeting %
1.	Hardworking	Behavior that shows genuine effort in overcoming various obstacles to learning and assignments, as well as completing the task as well as possible	71,57	73,23	71,88	80,67
		Behavior that shows a serious and serious attitude to learning	72,67	73,33	88,75	96,67
2.	Curriosity	Attitudes and actions that always strive to find out more deeply and broadly from the things they learn, see, and hear.	77,14	73,33	73,75	83,33
		Behavior that shows student attitude reads books and asks about the subject matter	71,80	83,53	73,53	73,83
3.	Environment Care	Attitudes and actions that always try to prevent damage to the surrounding natural environment, and develop efforts to repair the natural damage that has occurred.	86,77	86,87	76,85	80,40
		Behavior that shows care for the environment	82,58	86,87	98,73	98,73
4.	Social Care	Attitudes and actions respect differences of opinion in groups	78,87	89,30	89,50	88,00
		Attitudes and actions that always want to provide assistance to other people and communities in need.	95,74	98,87	96,85	97,67
5.	Responsibility	Attitude and behavior of a person to carry out his duties and obligations that he should do to himself	82,14	99,20	98,65	98,33
		The attitude and behavior of a person to carry out his duties and obligations, which he should do, towards the community, the environment (natural, social and cultural), the country and the Almighty God.	96,81	92,77	93,65	92,33

The results showed an increase in scientific literacy after science learning integrated ethnoscience was due to the implementation of science learning integrated ethnoscience gave students the freedom to conduct various learning activities such as letting them train themselves to draw conclusions. Providing information about the activities to be carried out also encourages students to do aspects of scientific literacy in learning. One of the way to help someone to be able to do aspects of scientific literacy well is to let them train themselves to draw conclusions based only on instructions or indirect evidence [10, 12]. Student activity during science learning integrated ethnoscience is accompanied by student scientific literacy which shows an increase. Science literacy means knowledge and

understanding of scientific concepts and processes needed for personal decision making, participation in social and cultural affairs, and economic productivity [13]. Improving scientific literacy through integrated science learning ethnoscience is developing abilities, creativity, utilizing the right knowledge based on scientific evidence and skills, especially with relevance to everyday life and career, in solving itself, challenging but meaningful scientific problems and making social decisions responsible scientific.

In science learning integrated ethnoscience activities have covered all four aspects of scientific literacy. In the integrated science ethnics learning process students learn by observing and practicing the process of making batik, with a little guidance from batik craftsmen directly, students can understand the concept of science concepts that exist in the process of making batik. By practicing batik making students will work according to the steps contained in the practicum instructions that have been prepared. Observation activities, discussing, then presenting the results in front of the class after the student has previously made an observation report is part of aspects of aspects of scientific literacy which is if carried out by students well then after learning students will have better scientific literacy than before [7, 15, 16]. The lowest scientific literacy is the ability to convey observational results orally which is in a sufficient category. This means that students do not have good skills in communicating the results of observations in front of the class to explain the results to their grouping together. The skills to convey observations orally need to be re-trained so that students can convey their observations well, be coherent and easily understood by students and other groups [4, 5].

The results of the implementation of integrated science learning also resulted in an increase in the scientific character of students. This increase was caused by science learning that integrated ethnoscience, wherein integrated science learning ethnoscience connects the culture of making batik that develops in the community with science learning. Learning is done by giving assignments to students to observe the process of making batik directly, then discussing the processes that occur in making batik using the science concepts through class discussion and conveying it in front of the class. Then at the second meeting discussing science material related to the developing local culture. Students are asked to look for examples of cultural products in which they contain elements of science that are in the environment around the students, after that students prepare guidelines for making batik. At the third meeting, students carried out the batik making practicum in accordance with the batik manufacturing practice instructions that had been prepared by each group at the previous meeting. By following and doing all activities in integrated science learning ethnics, students will know that in the process of making batik there is a concept of scientific concepts that they have never known before. In batik making practicum activities, students do the process of making batik as well as students have participated in the process of making batik so that it can improve the scientific character, recognition and appreciation of students towards the profession of batik craftsmen and batik as a result of his work. Improvement of scientific character can occur if someone experiences a direct or indirect experience in the art or culture, wherein this study the artwork or culture is a profession of batik craftsmen along with batik as a result of his work [6, 8, 9, 17].

Based on the results of an analysis of the data on scientific literacy and scientific character, it is known that students' scientific literacy in learning activities has a positive impact on students' scientific character, so that the higher the scientific literacy of students in learning, the higher the scientific character achieved by students. The increase in scientific literacy and the scientific character of students in science learning integrated ethnoscience shows that learning that has been implemented is effective in improving scientific literacy and scientific character of students in the elementary school teacher education program in the Teaching and Education Faculty Yogyakarta PGRI University.

4. Conclusion

Science learning integrated ethnoscience can improve students' scientific literacy with a gain score of 0.81 which is included in the high category. The average score of students' scientific character in science learning integrated ethnoscience is in the high category, where the average score of scientific characters in each aspect at each meeting is > 70%.

5. Acknowledgments

The writer expresses a great thank to DRPM Ristekdikti as the research funder. She also expresses her great gratitude to LPPM and Rector of Universitas PGRI Yogyakarta for giving the research permit to conduct the research.

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