Ethnoscience learning: how do teacher implementing to increase scientific literacy in junior high school

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Article Info

Article history:

Received Feb 11, 2023
Revised Nov 14, 2023
Accepted Nov 30, 2023

Keywords:

Ethnoscience
Local wisdom
Science learning
Scientific literacy
Student experience

ABSTRACT

Ethnoscience learning is an activity that connects local wisdom or cultural with science concepts. A mixed method study with an embedded design was used to describe how do teachers apply ethnoscience learning to increase scientific literacy. A total of 90 students grade 8th in District Muaro Jambi were involved in this study consisted of three classes. In-depth interviews and observations were conducted to collect qualitative data. The observation was used to determine the suitability of learning with the lesson plan. Deep interviews were used to explore teacher and student experiences in implementing ethnoscience learning. A teacher and three students were randomly selected as key informants. The quantitative data were collected by scientific literacy test that consisted of ten multiple choices. It has been tested for validity and reliability. The result of the reliability test is 0.85 with a very high category. Increase in scientific literacy is measured by normalized gain (N-gain). The analysis of variance (ANOVA) test was applied to determine scientific literacy differences between groups. Ethnoscience learning had been implemented by teacher in three different class on topic simple machines. It was designed by integrating local wisdom as a context for finding scientific concepts. The learning was designed by following a discovery model. The implementation of ethnoscience learning can increase scientific literacy with medium category. There was no significant difference between three classes.

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1. INTRODUCTION

Scientific literacy is an important aspect in science learning. It is understanding science and how to use scientific knowledge to solve scientific problems in everyday life, environment and technology [1]. Scientific literacy is defined as a person's ability to use scientific knowledge to find scientific facts, analyze, interpret data and information and make generalizations [2], [3]. It is included the concept of science, used to solve the problems in the fields between science, technology, environment and society [4], [5]. Scientific literacy consist of four aspects, such as knowledge, competence, contexts, and attitude [6].

According to the program for international student assessment (PISA), students' scientific literacy in Indonesia are low grade. On 2015, students' scientific literacy in Indonesia were ranked 64th from 72 countries, with the score 403 [6]. On 2018, students' scientific literacy in Indonesia were ranked 74th from 79 countries, with the score 396 [7]. Moreover, the result of Indonesian National Assessment Program (INAP) showed that 73.61% of students' scientific literacy are in the low category, and 25.38% is in the sufficient category.

According to the observation at four junior high school in Muaro Jambi, Indonesia, there were some problems such as the mastery of science concepts was low category. The students had difficulty in applying the scientific concept to answer the problems of daily life. It is because of the learning was teacher-centered. Teachers usually explain the material, given examples of the problem, and given the test or exercise at the end of the lesson. The habits are memorized the material in the text book. Students are not used to problem solving and discover science concepts. Jufrida *et al.* [2] found that at Junior Hight School in Muaro Jambi obtained an average score for scientific literacy 33.7 (moderate) and score 21.5 (very low) for science learning outcomes. It shows positive correlation between the scientific literacy and learning outcomes.

The problem about scientific literacy must be noticed from all parties. The efforts to improve the quality of science learning must be always carried out by teachers. Scientific context literacy deals with applications of science in daily life. Thus, science learning must be contextual and accustom students to make direct observations of scientific objects, so that students can gained experience. Meaningful learning will be created if using contexts that are directly related to the environment and daily life as well as local wisdom.

The solution for this problem was by implementing ethnoscience learning. Ethnoscience can be defined as knowledge based on culture and events found in society [8]. Ethnoscience was an activity to link between science with society knowledge that comes from hereditary beliefs and still contains myths [9], [10]. Local knowledge was defined as knowledge developed by the local community which is obtained through mimicry, imitation, trial and error, practice in daily life that is comprehensive and integrated in tradition and culture [11]. Ethnoscience was closely related to local wisdom. Local wisdom was knowledge and action that includes the creativity, taste and work of the community in interacting and overcoming local problems. Local wisdom was a cultural identity that needs to be introduced to the younger generation through education [12]. Local wisdom also means positive human behavior related to nature and its surroundings [13]. Local wisdom has two main elements, there are humans with their mindset and nature with their climate [14]. Ethnoscience learning was an integrated local wisdom and science content in learning. Local wisdom was used as a context in learning science content.

Studies on ethnoscience have been conducted; Kurniawati *et al.* [15] researching Jember comics and local wisdom as natural science teaching materials. The learning that oriented to local wisdom is able to realize and contextual learning because it is closely to student life, so that the topic/material becomes easier for students to understand. Setiawan *et al.* [16] developed a science module based on local wisdom with the theme of the Kelud eruption to increase scientific literacy. Students can construct knowledge and its relation to local wisdom in the area. Science learning based on local wisdom also can improve scientific literacy [17], [18], creativity, learning outcomes and students' environmental awareness [19]–[21]. Saefullah *et al.* [22] stated that the integrated guided inquiry learning model of the local wisdom of the Baduy community has an effect on increasing students' scientific literacy in science learning. The research of Basuki *et al.* [23] show that some of Jambi's local wisdom has great potential to be used as a source of science learning. Sumarni *et al.* [24] explained that science learning should be integrate local wisdom to connecting of concepts, processes and contexts, so that students' scientific understanding of natural phenomena would be more meaningful and contextual. Local wisdom-based science learning is very important to provide contextual learning insights in improving critical thinking skills because this learning links the existing local wisdom with scientific knowledge already possessed by students [25]. Students' critical thinking skills can be improved by applying learning with ethnoscience videos [26]. The ethnoscience approach is effective for improving student scientific literacy, learning outcomes and entrepreneurial spirit [10], [27]. Ethnoscience-based learning is effective for improving learning outcomes and science process skills [28], [29]. Furthermore, Jufrida *et al.* [30] have been developed science textbook based on Jambi's local wisdom that is suitable for use in science learning. The ethnoscience research uses a lot of quantitative approaches or research and development.

The novelty of this research is integrating the local wisdom of *tangkul/anco* (lift net), the Kajang Lako stilt houses, and wooden pulleys on the topic of simple machines. This research combines qualitative and quantitative approaches. The qualitative approach is used to describe how teachers implement ethnoscience learning on the topic of simple machines. The quantitative approach is used to measure scientific literacy after participating on ethnoscience learning. Ethnoscience learning was designed with a discovery model using local wisdom context on *tangkul/anco*, the Kajang Lako stilt houses, and wooden pulleys.

2. RESEARCH METHOD

A mixed method study with an embedded design was used to describe how do teachers apply ethnoscience learning to increase scientific literacy. The qualitative as primary method and the quantitative as secondary method. The embedded design is shown in Figure 1.

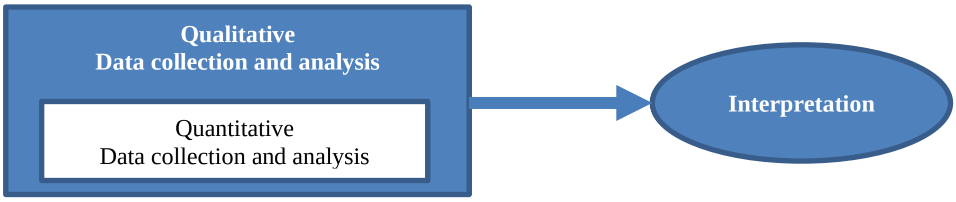

Figure 1. Embedded design [31]

It begins designing an ethnoscience lesson on the topic simple machines which consists of lesson plans, worksheets, teaching materials, and scientific literacy tests. The ethnoscience lesson has been assessed by experts and declared valid. Ethnoscience learning was applied for grade 8th junior high school in Muaro Jambi District, Indonesia. A total of 90 students grade 8th were involved in this study consisted 32 male and 58 female. The research was used total sampling. Before participating in learning, they are given a pre-test and after participating in learning, they are given a post-test. The research design is shown in Table 1.

Table 1. The research design

Group	Pre-test	Treatment	Post-test
VIII A (30 Students)	T1	Ethnoscience learning (EL)	T2
VIII B (30 Students)	T1	Ethnoscience learning (EL)	T2
VIII C (30 Students)	T1	Ethnoscience learning (EL)	T2

The qualitative data were collected by observation dan deep interview. The observation was used to determine the suitability of learning with the lesson plan. Deep interviews were used to explore teacher and students experience in implementing ethnoscience learning. A teacher and three students were randomly selected as key informants. Each class selected one student as a respondent. Qualitative data were analyzed descriptively. The quantitative data were collected by scientific literacy test that consisted of ten multiple choices. Indicators of scientific literacy involved content knowledge, procedural knowledge, competence to explain scientific phenomena, competence to identify scientific problems, and competence to use scientific evidence [7]. The indicators of scientific literacy are shown in Table 2.

Table 2. Indicators of scientific literacy questions

Topic	Item indicator	Item
Lever	Given pictures of lift nets, students are asked to explain the working principle of levers on lift nets.	1 & 2
	Given a picture of a lever, the length of the force arm and the load arm, students are asked to calculate the mechanical advantage of the lever.	3 & 4
	Given several pictures of the types of levers, students are asked to classify the types of levers.	5 & 6
Incline plane	Given a picture of a ladder in Kajang Lako house, students are asked to determine the mechanical advantage on an inclined plane.	7
	Given a picture of two ladders with the same height but different slanted lengths, students are asked to determine which one has the greater mechanical advantage.	8
Pulley	Students can explain the principle of a fixed pulley.	9
	Given a picture of a person lifting weights using a rope with fixed pulleys and without pulleys, students are asked to explain the mechanical advantage of pulleys.	10

It has been tested for validity and reliability. The result of the reliability test is 0.85 with a very high category. Quantitative data were analyzed using descriptive statistics (mean, maximum, minimum, variance, standard deviation) and Normalized Gain (N-Gain). N-Gain was used to determine the increase in scientific literacy before and after treatment. N Gain values are grouped into three categories shown in Table 3 [32].

Furthermore, the analysis of variance (ANOVA) test was applied to determine scientific literacy differences between groups. The ANOVA test was carried out using SPSS 22 for windows with a significance level of 5% [33]. The decision criterion used is to reject H_0 if the significance value is less than 0.05.

Table 3. N Gain category

N Gain	Category
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g < 0.3$	Low

3. RESULTS AND DISCUSSION

3.1. How is teacher applying ethnoscience learning in the classroom?

There are three stages that must be carried out in implementing ethnoscience learning. It includes analyzing the potential of local wisdom and scientific concepts, mapping basic competence, and developing lesson plans. In this study, the objects of local wisdom had analyzed included *tangkul* (lift nets), Kajang Lako stilt houses, and pulleys on wells. These objects have relevance to the simple machines concept on grade 8th junior high school. Furthermore, mapping basic competencies, scientific concepts, and local wisdom. The mapping results are shown in Table 4.

Table 4. Mapping basic competencies, scientific concepts, and local wisdom

Basic competencies	Scientific concepts	Local wisdom
3.3. Explain the concept of work, simple machines, and their application in everyday life, including the work of muscles in the human skeletal structure 4.3. Presenting the results of investigations or problems solving about the benefits of using simple machines in everyday life	Simple machines concept: 1. Lever 2. Inclined plane 3. Pulley	*Tangkul* lift nets Kajang Lako stilt houses pulleys on wells

Ethnoscience learning was designed using the discovery model. It is a constructivist model that encourages students to make observations, exploration and experiment to find scientific concepts [34]. The syntax was stimulation, problem statement, data collection, data processing, verification, and generalization [35]. The discovery model that integrates ethnoscience uses local wisdom as a context or problems. The stimulation and problems given by the teacher are related to local wisdom. Ethnoscience learning connects culture or local wisdom with science concepts [18], [36]. Ethnoscience learning had developed on the topic of simple machines. The lesson plan was designed for three meetings with each topic of levers, inclined planes, pulleys and the relationship of the wheels. *Tangkul* (lift nets), Kajang Lako stilt houses, and pulleys on wells were used as contexts and problems in discovering scientific concepts.

3.2. Stimulation

Students are given a stimulus by questions, phenomena, examples or pictures that can encourage student curiosity [37], [38]. In ethnoscience learning, the stimulus given is pictures and descriptions about local wisdom related to the topic [39]. Teacher provides a stimulus by showing pictures of local wisdom related to the topic of simple machines. Examples of learning activities:

Tell students, "Today we will discuss about simple machines"
The teacher asks: What do you know about simple machines?
The teacher displays a picture of a fisherman catching fish with "tangkul" (lift nets) on Figure 2.
Tangkul is a traditional fishing gear used by the people of Jambi, Indonesia. Tangkul is a kind of lift net consisting of a square-shaped net whose four ends are tied to two bamboo sticks crossing. The crossing point is tied and hung by a long bamboo tip. Between the nets and the ends of the poles are made of supporting wood to make it easier to lift the nets. Tangkul is operated by immersing the net in a horizontal position in the water, and then lifting it by pulling the rope tied to the other end of the bamboo.

Figure 2. *Tangkul* (lift nets)

3.3. Problem statement

Students are guided to identify problems related to the topic and guides them to formulate problems or hypotheses [40]. Students identify problems about *tangkul*. The teacher helps focus the problem to be solved by asking questions. The teacher asks questions related to levers, inclined planes and pulleys. Examples of learning activities:

Tell students: Lever is one type of simple machine that is widely used in daily life. The lever consists of load, load arm, fulcrum, force, and force arm. Tangkul is example of a lever that is widely used by the people in Jambi.
Questions:
1) *Why are we able to lift the nets easily even though the load is heavy?*
2) *Where is the fulcrum placed so that the work done becomes smaller to lift the net?*

Make a hypothesis from the question or problem.

3.4. Data collection

Students explore through observing objects, experimenting, and gathering relevant information to prove hypotheses [39]. Students make small groups and carry out investigations about the liver according to the procedures on the worksheet.

Please makes small groups, each group consists of 5 people. Tell students, "We are going to do an investigation about the lever. Please read the procedure on the worksheet."
Tools and materials: Beam/arm, load, fulcrum.
Procedure:
1) *Arrange the tools like in the Figure 3!*
2) *Place the fulcrum at point A, then lift the load by applying force to the end of the wood.*
3) *Repeat step 2, changing the position of the fulcrum at points B and C.*
4) *Please, write the experimental results in the following Table 5!*

Looking information about the types of levers commonly used in everyday life. Please discuss. Classify examples of types of levers based on the location of their fulcrum. Write your answers on the worksheet.

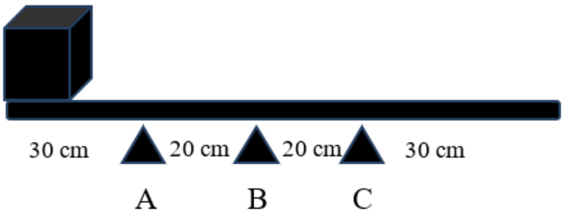

Figure 3. Experimental design

Table 5. The experimental results

Fulcrum position	Effort
A	
B	
C	

3.5. Data processing

The teacher invites students to analyzed the data that has been collected through experiments, observations, and literature studies and then interprets them [38]. Data processing is done by selecting and classifying data that is relevant to the problem as a basis for concluding. Students will acquire new knowledge based on data obtained through the scientific method [40]. Students discuss to analyze the experimental data by answering scaffolding questions on the worksheet. Examples of learning activities:

Tell students, "Answer the questions on the worksheet about the relationship between load points, fulcrum points, force points, load arms, and force arms."

1) *Compare, where is the fulcrum located to make it easier to lift the load!*
2) *If the effort arm (Le) is greater than the load arm (Lr) then the force (F)….*
3) *If the effort arm (Le) is smaller than the load arm (Lr) then the force (F) ….*
4) *Mechanical Advantage (MA) =Le/Lr*
   MA at Point A =
   MA at point B =
   MA at point C =
5) *Based on the location of the fulcrum, the lever is divided into 3 types. Types of lever following on Figure 4.*
6) *Write examples of the types of levers that are often used in daily life in the Table 6.*

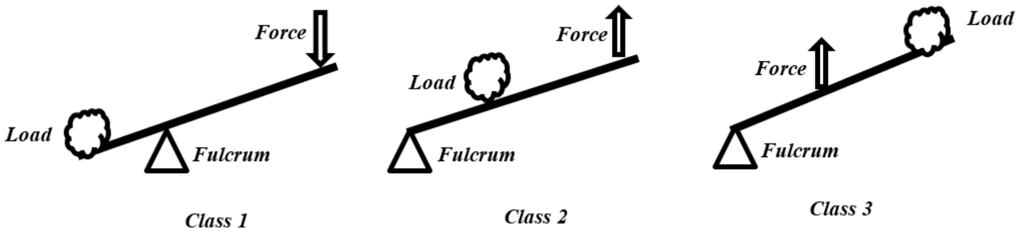

Figure 4. Types of lever

Table 6. Classification of lever

First class	Second class	Third class

3.6. Verification

Students verify the data carefully to prove the hypothesis [41]. Teachers provide opportunities for students to discover a concept, law, and theory based on the results of the investigation. Student presented finding and discuss to verify the finding [42]. Examples of learning activities:

1) *Ask students to do a careful examination. Whether the hypothesis is in accordance with the findings of the data or not.*
2) *Each group presented their findings about levers classically. The other groups gave their responses and asked to verify the findings about the lever.*

3.7. Generalization

Drawing conclusions based on the results of investigations that are relevant to the problem. It can be taken as a general principle and applies to all the same problems [41]. The teacher guides students to make conclusions about the topic of simple machines. Examples of learning activities:

Ask students to draw conclusions based on the results of their investigations about levers, mechanical advantage, types of lever and their relationship to the "tangkul." Write your conclusions on the worksheet.

An ethnoscience learning had been implemented by teacher in three different class. Observations were made to determine the feasibility of the ethnoscience learning plan. The results of applying ethnoscience are described in Table 7.

Over all, the application of ethnoscience learning was successful in three classes. It conforms to the syntax of the discovery model. In-depth interviews were conducted to explore teacher's experiences in implementing ethnoscience learning. The starting point is to provide a stimulus that connect local wisdom with scientific concepts. It is in line with teacher experience that the key to success is providing stimulus and questions. Displaying images of *tangkul*, Kajang Lako house, and well controls make students more enthusiastic and focused on learning.

Table 7. The implementing ethnoscience learning result

No	Learning activities	Observation Class A	Class B	Class C
1	Stimulation The teacher provides a stimulus by showing pictures of local wisdom related to the topic of simple machines including *tangkul*, Kajang Lako stilt houses, and well pulleys.	Very Good	Very Good	Very Good
2	Problem statement The teacher asks questions related to levers, inclined planes and pulleys.	Very Good	Very Good	Very Good
3	Data collection 1) The teacher guides students to form groups. Each group consists of 4-5 students. 2) Tell students "We are going to do an investigation about simple machines. Please read the procedure on worksheet".	Good	Good	Good
4	Data processing Students discuss to analyze the experimental data by answering scaffolding questions on the worksheet	Good	Good	Good
5	Verification 1) Each group presented their findings about simple machines classically 2) The other groups gave their responses and asked to verify the findings about simple machines	Good	Good	Good
6	Generalization The teacher guides students to make conclusions about the topic of simple machines	Good	Good	Good

Q: *How is your experience in implementing ethnoscience learning?*

"*This is my first experience in implementing ethnoscience learning. I did not expect that local wisdom and culture would be used as science learning resources. At the beginning, students not focused, but after I show the picture of tangkul, they became interested and enthusiastic. I asked questions about tangkul, Kajang Lako house, and well controls related to levers, inclined planes and pulleys. I also share worksheets that can guide them through experiments. I asked them to make small groups, 4-5 students and asked them to sit in their groups. To make sure they understand the problem to be solved, I ask one of the students to read out the question. Then I told the students that we would conduct an investigation/experiment according to the procedure on the worksheet. I asked students to read the experimental procedure on the worksheet. After that, I asked students to start working in groups. I go around the class to make sure all students are involved in the investigation process. I also provide assistance to groups that are having difficulties. After finishing the experiment, I asked students to discuss answering scaffolding questions on worksheets. Scaffolding questions really help students find concepts and relationships between concepts. Next, I asked each group to present their experimental results classically. This trains students to communicate ideas. I also provide additional explanations about levers, inclined planes and pulleys and their applications in daily life. The end of the lesson the teacher guides students to conclude the topic simple machines.*"

Q: *Can ethnoscience learning increase scientific literacy?*

"*Yes, I think that this ethnoscience learning can improve scientific literacy. It connects students' real life with science concepts. Local wisdom and culture are used as a context in learning science. Students are trained to finding concepts and problems solving through observation, experimentation and gathering relevant information.*"

In-depth interviews were conducted to explore students' experiences and responses to ethnoscience learning.

Q1: Do you enjoy participating in ethnoscience learning? Why?

A1: *Yes, I am very happy. I like doing experiments, because I can try new things.*

A2: *I really enjoy learning to relate examples in daily life. I like tangkul because it's near my house.*

A3: *I am very happy because it connects to local wisdom and science concept.*

Q2: What is your experience doing investigations/experiments?

A1: *Doing experiments is fun and makes us active in learning*

A2: *It's fun and full of challenges, because we don't just learn from theory.*

A3: *It's very fun, we did an investigation on the application of the lever principle to the tangkul, the application of an inclined plane to ladder of Kajang Lako house, and the application of pulleys.*

Q3: Do the learning activities train you to communicate ideas?

A: *Yes, I am used to conveying ideas both in groups and in class*.

A2: *Yes, we discussed exchanging ideas, you also presented the results of the group*.

A3: *Yes, we exchange ideas when doing practicums and working on worksheets*.

Q4: Do the learning activities encourage collaboration?

A: Yes, learning activities are formed in groups of 5 people, we share tasks in groups.
A2: Yes, we divide tasks such as recording data, experimenting and looking for references.
A3: We share the task.

Q5: Do you easy to understand the concept of simple machines?

A1: Yes, because examples of the application of simple machines are easy to find around us.
A2: Easy to understand because I'm involved in discovering the concept.
A3: It is easy for me to understand simple machines because it uses the example of a tangkul, ladder, and well pulley.

Based on the interview results obtained information that students feel happy and enthusiastic because it is associated with everyday life. Students can also find out about the local wisdom of the *tangkul*, the Kajang Lako house, and the pulley of the well. Ethnoscience learning becomes fun and full of challenges. Students become active in carrying out investigations to find concepts or solve problems. Ethnoscience learning develops communication skills. Students discuss, exchange ideas both in groups and in class. Students also presented the results of group work in front of the class. Ethnoscience learning encourages students to collaborate.

3.8. Scientific literacy

Students' scientific literacy was measured through pretest and posttest. The increase in scientific literacy was determined by the value of N gain. The results of the pretest, posttest, and N gain are shown in Table 8.

Table 8. The results of the pretest, posttest, and N gain

	Class A			Class B			Class C		
	Pretest	Posttest	Gain	Pretest	Posttest	Gain	Pretest	Posttest	Gain
Mean	59.33	75.60	0.39	58.33	76.73	0.43	56.80	73.43	0.37
S. Deviation	11.62	7.66		11.33	7.13		11.29	6.74	
Max	80.00	90.00		78.00	87.00		76.00	86.00	
Min	35.00	60.00		35.00	56.00		34.00	56.00	

Based on Table 6, it can be seen that the N-gain values for Class A =0.49, Class B =0.53, and Class C =0.53 in the medium category. This shows that after participating in ethnoscience learning there is an increase in scientific literacy in the moderate category. Furthermore, hypothesis testing was carried out to find out statistically whether there is an average difference between the three classes. The normality and homogeneity requirements tests have been carried out on the N-gain data. The normality test for the N-gain data was carried out using the Kolmogorov-Smirnov test at a significance level of 5%. The results are shown in Table 9.

Based on the results of the normality test, it can be seen that the significance value in the three classes is >0.05. This shows that the scientific literacy N-gain data is normally distributed. Homogeneity test was carried out using Levene's test with a significance level of 5%. The homogeneity test results can be seen in Table 10.

Table 9. Tests of normality

	Ethnoscience	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
N-Gain scientific literacy	Class A	0.101	30	0.200*
	Class B	0.146	30	0.100
	Class C	0.093	30	0.200*

Table 10. Test of homogeneity of variances

N Gain scientific literacy			
Levene statistic	df1	df2	Sig.
0.628	2	87	0.536

Based on the results of the homogeneity test, a significance value of 0.536>0.05 is obtained. This shows that the scientific literacy N-gain data has homogeneous variance. Test the difference in the average value of scientific literacy is done by ANOVA test with a significance level of 5%. The results of the ANOVA test are shown in Table 11.

Table 11. ANOVA test

	N Gain scientific literacy				
	Sum of Squares	df	Mean Square	F	Sig.
Between groups	0.058	2	0.029	2.174	0.120
Within groups	1.164	87	0.013		
Total	1.222	89			

Based on the results of the t test in Table 9, it can be seen that the N-gain significance value for scientific literacy is 0.12>0.05, so H0 is accepted. This shows that there is no significant difference in the mean scientific literacy in the three classes. Ethnoscience learning has the same impact on all three classes. The increase in scientific literacy in the three classes can be seen in Figure 5.

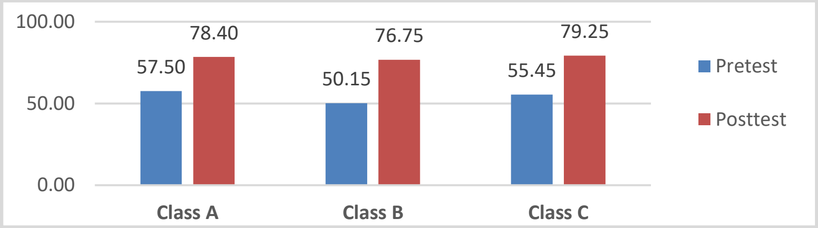

Figure 5. Increased scientific literacy

Integrating local wisdom as a context for finding scientific concepts will connect students with real life and phenomena related to science. Science literacy is closely related to the application of science in daily life [34]. Meaningful learning will be created if using contexts that are directly related to the environment and daily life as well as local wisdom [43]. Learning activities begin by providing a stimulus by displaying pictures of lift nets, Kajang Lako stilts houses and pulleys on wells. The teacher gives problems related to simple machines. The teacher gives worksheets and guides students to collect data. Students analyze experimental data to answer problems. The teacher guides students to compare the data obtained through experiments with the theory that has been studied. The teacher guides students to make conclusions based on the results of the experiment.

The results of this research are in line with previous studies [22], [44] that "the science learning integrated ethnoscience can improve students' scientific literacy and scientific character." Science learning based on local wisdom can encourage students to build and make connections between knowledge and reality in the environment [16]. Science learning based on local wisdom can also increase scientific literacy, creativity, learning outcomes and student environmental awareness [45]–[47]. The implement PBL-based worksheets integrated with green chemistry and ethnoscience can improve thinking skills, which included generic science skills and critical thinking skills [48].

Science learning that integrates local wisdom can connect concepts, processes and contexts, so that students' scientific understanding of natural phenomena will be more meaningful and contextual [49]–[51]. Cultural and environmental oriented science learning to provide students with an adequate foundation, which is able to solve their problems and society [52]. Local wisdom-based science learning is very important to provide insight into contextual learning in improving critical thinking skills because this learning connects the existing local culture with the scientific knowledge that students already have [25]. Local wisdom based learning is able to deepen the concept of science and foster a character of conservation through the reconstruction of original science [43], [53].

The application of ethnoscience learning is also involves students in finding concepts through investigations, experiments, and group discussions. Science should be learned according to the nature of science to apply scientific methods through data collection/experimentation, observation, and deduction to produce concepts [54]. Science is essentially a collection of knowledge obtained through investigations (scientific processes) to explain natural phenomena so as to foster attitudes and creativity [55], [56].

The limitations of this study focus on scientific literacy by applying a discovery model that is integrated with ethnoscience. Ethnoscience in this study used Jambi local wisdom objects including *tangkul* lift nets, Kajang Lako stilt houses, and pulleys on wells. The further researcher is expected to conduct research by adding more complex variables such as conceptual understanding, critical thinking, creative thinking, process skills, and scientific attitudes. Ethnoscience can be developed by integrating with other learning models such as inquiry, STEM, contextual teaching learning, or problem base learning.

4. CONCLUSION

The stages of implementing ethnoscience learning include analyzing the potential of local wisdom and scientific concepts, mapping basic competence, and developing lesson plans. Ethnoscience learning was designed using discovery model that integrating local wisdom as a context for finding scientific concepts. Learning activities begin by providing a stimulus that connecting the local wisdom with the topic discussed, for example displaying pictures of lift nets, Kajang Lako stilts houses and pulleys on wells. The key to success is providing stimulation that links local wisdom with scientific concepts. Teacher asks questions related to the context of local wisdom and the topic about levers, inclined planes and pulleys. The teacher gives worksheets and guides students to collect data. Students discuss to analyze the experimental data by answering scaffolding questions on the worksheet. Students read the information on the handout to compare the results of the investigation with theory. Then, they presented the results of their investigation in front of the class. The teacher guides students to make conclusions based on the results of the experiment. The questions/problems must be relevant topic being studied. The implementation of ethnoscience learning was successful in three classes. It can increase of scientific literacy in the moderate category. There is no significant difference in the scientific literacy in the three classes. Ethnoscience has the same impact on all three classes.

The application of ethnoscience learning that is integrated with the discovery model has a significant influence on students' scientific literacy. Therefore, it is necessary to develop ethnoscience learning with different models and on other topics so that it can comprehensively improve students' scientific literacy. The results of this study can be used as a reference for science teachers in designing ethnoscience learning on different topics. Future researchers are expected to be able to develop ethnoscience learning that is integrated with inquiry, STEM, contextual teaching learning, or problem base learning.

ACKNOWLEDGEMENTS

Authors thanks to Ministry of Education, Culture and Higher Education and LPPM Universitas Jambi for providing funding for this research on fiscal year 2022.

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