IMPLEMENTATION OF ETHNOSCIENCE BASED SCIENCE LEARNING : LITERATUR REVIEW

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ABSTRACT

The level of science literacy in Indonesia is at a low level based on the results of the PISA test in 2018. Science literacy is an ability that must be mastered in the 21st century. Science literacy can be developed through ethnoscience. Ethnoscience is the transformation of the science of society into scientific science. This research is a literature review research with 10 SINTA-indexed journals and 2 Scopus-indexed journals. This study discusses the implementation of ethnoscience in science learning. Science learning that implements ethnoscience can be through learning media both electronic and print, learning models, direct and indirect learning resources, learning tools, and a combination of learning models and media. Learning by narrating ethnoscience can make the learning process more active, more meaningful, students can think analytically, are contextual, and can increase science literacy.

Keywords: *Ethnoscience, Literacy Science, Implementation Of Literacy Science*

A. Introduction

In today's modern science education, knowledge continues to be transferred through products, including laws, ideas, and facts. Indeed, science presented to students is an aspect of science as a process and attitude. This aspect is improved (Yuliati, 2017). Science learning has not been linked to everyday or contextual life. According to (Sumiati, 2009), contextual learning is prioritizing learning activities with studies and contexts in everyday life. Science learning can make students competent and the learning becomes meaningful or meaningful (Muhfahroyin & Oka, 2021).

One of the meaningful learning can be obtained by contextual learning or related to everyday life (Muhfahroyin & Oka, 2021). Considering the outcomes of research from (Yuni, 2022) stated that at this time many students cannot apply the results of science learning in everyday life. This is to the theory of meaningful learning according to David Ausuble, namely how students can apply existing experiences in their cognitive structures with newly acquired knowledge for meaningful learning to occur (Saputra, 2016). Indonesia is an archipelagic country rich in local culture and technology. Local culture and technology contain cultural values that can encourage a sense of nationalism. Local culture and technology can be preserved in education through classroom learning (Hidayah et al., 2017). One strategy to teach culture the goal of the educational process is to apply ethnoscience (Eka Rahayu et al., 2015). The following is data on ethnoscience search interest in the Indonesian region based on Google Trends data accessed on November 18, 2023 at 19:21 in the form of images:

Bagian-bagian yang dimaksud di atas tidak harus diuraikan dalam bentuk poin-poin terpisah. Ketajaman

Figure 1. Ethnoscience Search Interest in All Regions of Indonesia

Based on the data above, it shows that interest in studying and using ethnoscience as an educational pedagogy has not been evenly distributed throughout the archipelago in Indonesia. Ethnoscience is the activity of transforming original scientific knowledge with scientific science (Eka Rahayu et al., 2015). Genuine scientific knowledge is knowledge that offends facts that exist in society. This knowledge comes from previous generations that have been passed down from generation to generation. The scope of indigenous science knowledge or community science includes the fields of medicinal plants, agriculture, ecology, as well as the benefits of flora and fauna (Battiste, 2005). Ethnoscience in general is knowledge obtained from generation to generation without going through a formal educational process. Ethnoscience is not produced through a scientific process, but it can help tribes in the world to solve problems scientifically (Syazali & Umar, 2022)

Learning with the application of ethnoscience makes student-centered learning oriented learning from the beginning teacher centered learning (Dan et al., 2017). Learning by applying ethnoscience makes learning more meaningful because it may enhance pupils' undersit can increase students' appreciation of culturetanding of cultural diversity. and is able to create contextual learning

(S. E. Atmojo, 2012). Ethnoscientific knowledge has proven its truth through the scientific process so that it becomes scientific knowledge (Syazali & Umar, 2022). Learning through culture can improve students' science literacy skills (Sudarmin et al., 2014). Through ethnoscience-based learning, students can identify scientific questions, explain scientific phenomena and can draw conclusions based on natural phenomena that occur. This is part of science literacy. As many as 40%-70% of students in Indonesia achieve the minimum literacy competence, based on the results of the 2022 National Assessment, the results of the achievement of elementary school students are in the medium category, namely 61.53% of students have literacy competencies above the minimum (*Rapor Pendidikan Indonesia tahun 2023*, 2023). Educators and education practitioners must improve the literacy level of students in the good and very good categories. The minimum category does not make education in Indonesia complacent. Assessment is obtained from a sample or part of students at each level of education to carry out a random National Assessment. If the assessment is carried out for all students in Indonesia, the results of the National Assessment may change. The findings of the 2018 PISA study, which was released by the OECD, provide a more comprehensive analysis of Indonesian students' literacy outcomes. They reveal that, on average, Indonesian students scored 371, with an average OECD score of 487, in the reading domain. With an OECD average of 489, Indonesian students' average science score was 389.

Literacy skills are important for students as a basis for gaining new

knowledge, developing a critical and analytical mindset, and to face the era of globalization and technology as a provision of competitiveness. Literacy skills are basic skills of the 21st century in addition to the ability to think critically and creatively. Basic literacy includes reading literacy, science literacy, technological literacy or ICT, and numeracy literacy. Interactive learning can provide meaningful learning experiences to students and provide positive encouragement to students to develop the necessary characteristics and competencies. The quality of learning according to the results of the 2022 National Assessment shows that the results of learning quality achievements in elementary schools are in the medium category with a score of 65.39. Steps to improve the quality of teaching by creating learning that involves two-way communication between educators and students (*Rapor Pendidikan Indonesia tahun 2023*, 2023).

21st-century skills require learners to master basic skills. 21st-century skills that use core skills for daily life include reading literacy, numeracy, science, information and communication technology, finance culture, and society. Science learning plays an important role in arousing curiosity and instilling understanding in students about science and technology. One of the things that causes low science learning outcomes in everyday life is the inadequate selection of learning resources. In addition, the learning carried out is less associated with the reality that exists in everyday life. Ways to improve science learning outcomes by linking learning to local culture (Yuni, 2022). Ethnoscience is the role of learning pedagogy which includes: learning strategies, learning approaches, learning models, learning methods, and other groups. Other groups in question are learning tools, syllabi, lesson plans, and critical thinking instruments (Syazali & Umar, 2022). Based on this background, researchers conducted a literature study on the application of ethnoscience in science learning.

B. Method

This study is a review of the literature. A literature review is a type of research methodology that finds, evaluates, and interprets study data to address specific research concerns. (Turmuzi et al., 2022). The literature review method makes researchers identify journals in a structured manner by following the steps that have been applied. A literature review is carried out as a focused review of original articles containing abstracts, introductions, methods, and results. Article searches are carried out with Sinta, Google Scholar, and Scopus databases with ethnoscience-based learning keywords. The criteria for journal data used include ;

1) The journal will be published in the period 2016-2023.
2) Journal data obtained through Sinta, Google Scholar and Scopus databases.
3) Journal data obtained from Sinta 1 to Sinta 6 and Google Scholar as many as 10 articles.
4) International Journal obtained from Scopus as many as 2 articles.
5) The data used is in the form of journals related to efforts to apply ethnoscience in science learning.

C.Results and Discussion

Based on research conducted by (Eka Rahayu et al., 2015) regarding the effectiveness of local culture-based learning provides better results than

ordinary learning because learning is more meaningful and by everyday life. Ethnoscience is a strategy and design for creating a learning environment that is integrated with culture (Sardjiyo, 2005). Ethnoscience applied in learning produces a positive response (Hastuti et al., 2021) (Hikmawati et al., 2021) (Sarwi et al., 2021) So that it can be developed again on an ongoing basis. Learning if related to everyday life will be more meaningful and easy for students to absorb because it is by the lives and experiences encountered by students. Ethnoscience-based learning according to Atmojo (Pertiwi & Firdausi, 2019) can transform Teacher Center Learning-based learning into Student Center Learning, creating a contextual learning climate and meaningful learning. Science learning presents the concept of learning biology, chemistry, and physics with phenomena in the daily lives of students (Yustiqvar et al., 2019). The delivery of concepts cannot always be accepted by students with open eyes, intermediaries are needed to convey abstract concepts in learning, including learning media and communication tools. Learning media plays a role in connecting students with learning resources (Fatimah & Bramastia, 2022). The use of learning media and abstract concepts in science learning can be understood by students (Nur et al., 2017). Based on the results of research conducted by (Hayati, 2023) It was found that students experienced

problems and obstacles in learning science. One of the obstacles that occur is that students tend to be more passive. Passive learning can be anticipated with fun and interesting learning, one of which is using fun learning models and methods, students can feel or do activities directly (Pujilestari et al., 2022).

A learning model is a form of description or design used by educators in the learning process when planning, implementing, and evaluating in a systematic way to obtain the expected learning outcomes (Aji, 2016). According to (Hanafi, 2018) Learning methods are ways of delivering material from educators to students with the aim that the material can be understood, known, and used by students. Based on the results of the analysis of 12 scientific articles, ethnoscience-based learning can be applied through the following efforts:

Tabel 1 Ethnoscience Impelementation Efforts

Media	3
Learning Model	3
Learning Resources	2
Learning Tools	3
Media and Learning Model	1

Based on the results of the scientific article search conducted, it was found that the most ethnoscience-based science learning articles use learning media and learning modiels. This is in accordance with Piaget's theory of learning. Piaget's learning theory

explains that each learner develops his thinking skills according to regular stages of thinking (Hariyanto, 2011). The thinking ability of elementary school-age students is at the concrete operational stage which is the transition from concrete thinking to abstract thinking. As for junior and senior high school age, students use abstract thinking that dominates without leaving concrete thoughts. This is by Permendikbud No. 22 of 2016 which recommends that discovery/inquiry learning, problem-based learning, and project-based learning be applied. Based on the results of the analysis of the journal used, the following is the discussion:

1. Learning Media

Learning media as a culture that is part of pedagogy. Learning media that is used as an effort to improve ethnoscience research results from (Utari et al., 2020) is an ethnoscience-based chemistry module. This learning module contains ethnoscience activities carried out by salt farmers. This activity is related to the ethnoscience of the salt-making process which is integrated into chemistry learning. The module contains tasks and activities related to ethnoscience that will improve science literacy skills with indicators able to explain natural phenomena that occur and transform into scientific knowledge. Based on

research conducted by (Fiteriani et al., 2021) produce learning media in the form of posters with an ethnoscience approach to science learning. Based on the results of product trials, a percentage of product satisfaction was obtained of 91% so that poster media is very suitable to be used as a science learning media in elementary schools and MI. The results of this study show that ethnoscience-based media is recommended for teachers as learning media.

Based on research conducted by (Sulistri et al., 2020) Learning books in schools should be presented more interestingly and provide an element of interest to students to read them. The development of science and technology today is so rapid. The digital pocketbook is an implementation of innovation from the development of science and technology. Considering the basic skills that must be mastered in the 21st century to make a quality generation of the nation (Ariana et al., 2020). The result of this research is an ethnoscience-based digital pocket book on hot material and its transfer in Singkawang Elementary School suitable for use as a learning medium in the science learning process. The media used as an effort to teach ethnoscience in the articles obtained are represented in the following table:

Table. 2 Learning Media Used

Conventional Learning Media (Based On Paper)	Chemistry module
	Poster
Modern Learning Media (Based on Digital)	Digital Pocket Book

1. Learning Model

Based on research conducted by (W P Hadi et al., 2020) Learning with an ethnoscience approach with a discovery learning model obtained research results in the form of science literacy ability test results in the following bar chart:
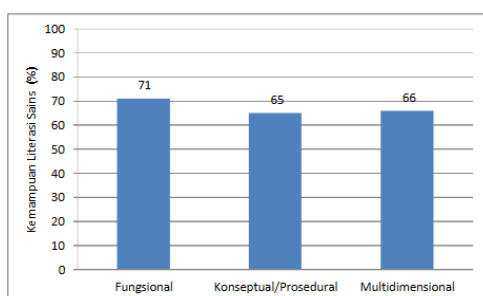
Figure 2. Results of Students' Science Literacy Skills

The results of this study explain that by using the discovery learning learning model, students can implement what is obtained from nature through scientific activities so that students can connect science concepts in everyday life in the form of ethnoscience. Learners can explain natural phenomena through the concept of science in everyday life. This can improve the science literacy ability of students. The discovery learning learning model can foster curiosity so that learning becomes more active. Based on the results of research from (Sartika et al., 2022) Ethno-STEM-based science learning uses a project-based learning model. The resulting project is a bag with a small sling strap (which has a small pressure) which is a product of SMEs Tanggulangin District, Sidoarjo Regency. Based on the data obtained, Ethno-STEM-based science learning can train analytical thinking skills.

2. Learning Resources

Based on research conducted by (Kriswanti & Suryanti, Supardi, 2020) Applied learning activities based on ethnoscience are oriented to students or SCT (Student Centered Learning). This study used One Group pretest and posttest design. The majority of students are able to achieve the science literacy completeness score tested. Ethnoscience-based learning tools on processed rawon are suitable for use to train students' science literacy skills. Based on research conducted by (Wiwin Puspita Hadi & Ahied, 2017) seawater and salt explain the concepts of mixed substances and single substances, chemical, and

physical properties in everyday life. The concept of science in the process of making table salt is the names of compounds, crystallization processes, and evaporation processes. The results of the study showed that the salt production process carried out by the local community is knowledge obtained from generation to generation and implemented in learning.

3. Learning Tools

Based on the results of research from (Ariningtyas et al., 2017) creating student worksheet designs that contain ethnoscience salt hydrolysis material has the aim of increasing students' science literacy. This research makes LKS which is used for learning materials for students to get to know the chemistry of the dangers of gendar consumed by the community for generations. Gendar is used by residents living around the Unggaran Kaliulo area, Pringapas District, Semarang Regency. The area has springs that can be used for making Bleng naturally. Bleng is a salt that is often used for making rice cakes and ketupat. This generator will later become a

scientific science studied by students because the material is related to the dangers of using borax as a food preservative in everyday life. Borax is a salt compound and hydrolysis reaction. These compounds and reactions can be used to chew food. The research used is Research and Development (R&D) research. Development models are carried out using modified 4D models. The LKS design used aims to improve students' science literacy. The results obtained in this study can be seen in the learning process where in the experimental class, students can identify and apply scientific knowledge to the concept of salt hydrolysis. Based on research conducted by (Melyasari et al., 2018) which was carried out because of the reflection of the results of studies on literacy skills in Tulungagung which were relatively low and previous researchers gave recommendations to develop learning materials that could improve scientific literacy skills, the researchers used batik media as a form of local culture. In this study, researchers made lesson plans, textbooks, and LKS (Student

Worksheets) as well as science literacy test instruments. There are four indicators used to test science literacy, namely; knowledge of science, science context, competence or process, and attitude. This study used a 4D model from Thiagarajan. Based on the assessment of three validators, the learning tools developed have a fairly valid category and can be tested for students on a limited basis in Tulungagung.

4. **Learning Models and Media**

Based on the results of research from (SABRINA, 2023) Ethnoscience-based LKPD with the SiMaYang learning model has a high influence on improving students' science literacy skills. Analysis of science literacy skills using data testing through posttest and pretest which is then analyzed using n-gain to test hypotheses. Based on research conducted by (Suryanti Suryanti et al., 2020) The development of learning materials can use local wisdom as a learning resource. The first step used is to observe local wisdom in the city of Surabaya, including rujak cingur, batik with clover plant motifs, and remo dance. The first activity was to

conduct interviews with clover motif batik craftsmen, remo dancers, and rujak cingur sellers. The results of the interview will then be analyzed to produce the transformation of science in the community into scientific science which will later be used as a learning resource. The following is the transformation of community science into scientific science based on research conducted by (S Suryanti, 2021) in table form :

Table 3. The Transformation of Science Society into Scientific Science

The tests used to measure science literacy are tests with indicators provided by PISA-OECD that contain problem-solving

meaningful. The results of this study, students can express existing thoughts well starting by identifying problems, explaining

Object of Research	Science Society	Scientific Science
Clover Batik Motifs	1. Using saline solution to make the color of batik cloth stronger.	1. Mordan is a metal salt added to the dipping solution to increase the intensity of color.
Remo Dance	1. The dance in the remo dance drops the sampur for the element of dance beauty. 2. Sampur that is dropped is always down	1. The process of dropping the sampur using muscle force. 2. The process of falling down is evidence of the force of gravity.
Rujak Cingur	1. Using a stone mortar to pound the spice of the chopped rojak to make it smooth quickly.	1. The contact of rough surfaces has an impact on the frictional force.

questions. It consists of 20 multiple-choice questions structured to meet the requirements. Based on research from (Setyo Eko Atmojo et al., 2019) Science conducted in schools today is only oriented towards textbooks and explanations from teachers. This kind of learning model makes students bored and not interested in the learning material taught. Learning that is directly centered on the existing community or culture will make learning more

scientific events that occur, and drawing conclusions from natural observations in the environment around Yogyakarta regarding batik culture, especially the process of making batik. The ability of these students makes it includes aspects of science literacy. Learning by applying ethnoscience to this study shows that learning models that relate to ethnoscience can improve students' science literacy skills.

D. Conclusion

It is possible to conduct ethnoscience-based learning using learning media, learning models, learning resources, and learning tools, and these methods can be combined

to create ethnoscience-based learning, according to the analysis conducted in the 12 scientific publications mentioned above. Ethnoscience-based education founded on studies by (Sartika et al., 2022) can improve analytical thinking. While based on research conducted by (SABRINA, 2023) Ethnoscience-based LKPD used in learning can improve students' science literacy skills. This proves that learning from natural resources or activities in the community can make the learning contextual and improve 21st-century abilities in students.

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