



# Analysis the Implementation of Ethnoscience Approach in Learning Science

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**Abstract:** Content analysis research aims to provide a literature review in the use of ethnoscience approaches in science learning. This analytical research uses a descriptive analysis method with a qualitative approach. Article documents were obtained through the Google Scholar and Sinta pages using the keywords "ethnoscience approach in science learning" and "ethnoscience-based science learning" in the range of 2017 to 2023. After going through the selection stage of several journal articles, 20 articles were found to be analyzed. The results of the analysis show that the implementation of the ethnoscience approach in junior high school science learning is effective in improving various abilities and skills of students such as thinking abilities, problem solving abilities, process skills and scientific literacy.

**Keywords:** Ethnoscience approach; Local wisdom; Science learning

## Introduction

Science is learning that studies a certain point of view from nature in a structured, systematic and scientific manner (Intika et al., 2020). According to Puspasari et al. (2019) science consists of a collection of principles, concepts, theories and laws developed from various scientific views and process skills. Through Science Learning it becomes a vehicle for learning about the natural surroundings so that students get direct learning experiences that involve everyday life (Pratama et al., 2022).

According to Tsai et al. (2020) science learning has so far been considered difficult and unrelated to students' daily lives. Therefore, various problems arise that student feel during the learning process. These problems such as the ability to think creatively, critically thinking skills, and scientific literacy of students who are still lacking. Sourced from the evaluation results PISA report in 2018 that the level of critical thinking skills in the science field of Indonesian students has a score of 396, this score has decreased from the calculation of the score in the previous year, namely 2015 with a score of 402 (Kemendikbud, 2019). Furthermore, the scientific

literacy of Indonesian students is still at level 2 or still below average (Dewi et al., 2019). This claim is supported by the 2012 PISA score which only scored 382 points. These results indicate that the average scientific literacy level of Indonesian students is low (Perwitasari et al., 2016). The low scientific literacy of Indonesian students is closely related to students' lack of understanding of science material. Therefore, innovation is needed in science learning so that students can more easily understand learning.

According to Wahyuni (2015) at this time learning science more often by doing reading activities, and memorizing material. Science itself is not learning that suppresses memorization (Maksić & Spasenovic, 2018). Science learning requires developing not only content knowledge, but procedural knowledge and cognitive knowledge (Kind & Osborne, 2017). Therefore, the implementation of science learning should be done contextually and scientifically to develop the ability to think, work and act scientifically as well as provide direct and meaningful experiences for students (Latifah et al., 2020).

According to Hadi et al. (2019) that meaningful learning can be achieved by integrating local culture or

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wisdom in science learning. This statement is in line with opinion Usmeldi & Amini (2020) that learning science with cultural content can be a way to create quality education. Besides that, the government has also supported local wisdom-based learning programs as an effort to preserve culture by enacting them Government regulation no 19 of 2005 regarding National Education standards Article 14 paragraph (1), it is stated that the curriculum for SMP/MTs/SMPLB or other equivalent forms can include education based on local excellence (Peraturan Pemerintah No. 19 Tahun, 2005). Local wisdom in this case is part of the culture that comes from the agreement of a community group and controls the activities of its people in their daily activities (Astuti, 2021).

Local wisdom is the norms of life and knowledge in the form of activities carried out by the local community to meet their life needs (Njatrijani, 2018). Based on another understanding that local wisdom is authentic knowledge about a community group, which is passed down from one generation to the next to regulate their lives (Khusniati, 2014). Through this local wisdom can shape the character of students by growing a sense of care, love and responsibility in maintaining and preserving culture in their area. This integrated learning of local wisdom can be done by associating culture with science concepts contained in junior high school materials. In this case an educator must have skills in integrating local culture with science concepts. Culture-based science learning innovation is ethnosience approach.

Ethnosience is indigenous knowledge that belongs to a particular tribe or group (Sudarmin, 2014). In another sense, it is explained that ethnosience is the knowledge or beliefs community groups from one generation to the next that can influence the interpretation and understanding of society (Fasasi, 2017). Based on the opinions of the two previous experts, it can be synthesized that ethnosience is the activity of integrating the original knowledge of a community or tribe passed down from generation to generation with scientific knowledge. According to Wati et al. (2021) with ethnosience-based learning students will find it easier to find facts and phenomena that exist in a group of people and can be combined with scientific science. So that the results of ethnosience can be utilizes as a source of student learning in culture-based science learning in schools (Syazali & Umar, 2022).

Much research related to ethnosience has been carried out, especially in secondary or junior high school education. Various ethnoscientific studies have proven their validity through the stages of the research process to produce scientific knowledge. The following is research related to ethnosience which is implemented in science learning, ethnosience studies in the process of making roof tiles which are integrated into scientific

knowledge (Najib, 2018). Furthermore, there is an ethnoscientific study of the culture of the Marind tribe in Papua, which turns out that the culture of the tribe contains natural science concepts in it (Supriyadi et al., 2020).

There are various ethno-science researches that are developed on an ongoing basis and linked to scientific literacy, creative and critical thinking skills, and student character. Some of them, such as innovative teaching materials, student worksheets integrated with ethnosience can increase student creativity (Andani et al., 2020). Sourced from the article that critical thinking skill and cultural car attitudes of students are increased by applying ethnosience based science learning (Hikmawati et al., 2021). Then through ethnosience learning in the process of smoking fish can increase student literacy (Perwitasari et al., 2016).

In this content analysis study, the researcher analyzed the implementation of the ethnosience approach in learning natural sciences in junior high schools. This research is important to do provide insight to educators or education students regarding what ethnosience is and how it is applied in science learning. This study aims to provide a literature review on the use of the ethnosience approach in science learning based on reviews of journal articles published through seminar proceedings and national and international journal articles in the 2017 to 2023 period.

## Method

This study uses a type of content analysis research with a descriptive qualitative approach. Content analysis research is a method of analyzing written, spoken, or visual communications that includes a qualitative or quantitative approach (Elo & Kyngäs, 2008; Bozkurt et al., 2015). In research using the analysis phase or literature review (Liberati et al., 2009; Wong et al., 2013; Snyder, 2019), as shown in figure 1. In this analytical research, data sources were obtained from seminar proceedings as well as national and international journal articles ranging from 2017 to 2023. Article searches were conducted via Scopus.com, Google Scholar and Sinta with the keywords used were "Ethnosience Approach in Learning Science" and "Ethnosience-based science learning" to obtain relevant articles.

The criteria selected as the data source are articles that discuss how to implement ethnosience in science learning at the junior high school level, both in the form of ethnosience studies on various cultures in Indonesia, the implementation of ethnosience in learning models and innovations in teaching materials containing ethnosience. After searching and filtering articles, 20 scientific articles were obtained which reviewed the implementation of ethnosience in learning natural

sciences in junior high schools. In this study using thematic analysis, the method used to identify data in detail related to a theme in research.

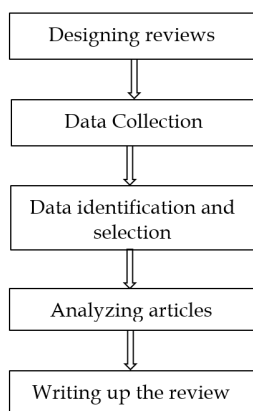


Figure 1. Research flow

### Result and Discussion

After through the data screening stage, total of 20 scientific articles were obtained. The following is an analysis of 20 scientific articles related to implementation ethnosience approach in learning science. Information is presented in Table 1.

Based on searches of journal articles that have been carried out both through the scopus.com, sinta.ac.id and Google Scholar pages with the keywords "ethnosience approach in natural science learning" and ethnosience-based natural science learning" with a total of 20 journals. If you look at several international articles related to the implementation of the ethno-science approach in learning science, it is not much different from the national articles, that the ethno-science approach is relevant if applied to learning science in junior high schools. Sourced from the analysis of articles in table 1, culture or local wisdom is very influential in implementing this approach in learning science at schools. Currently the preferred approach in science education is ethnosience, because this approach applies learning by integrating culture with scientific knowledge (Sudarmin, 2014). Therefore, an ethno-science approach can be carried out if there is a link between the original knowledge of a community group and the concepts contained in science material in junior high school or in this case scientific knowledge. So that in this case the teacher plays an active role and must be creative in involving local wisdom, especially in science learning. Because there is a lot of cultural diversity in Indonesia that can be explored as a source of learning science in junior high school (Hadi et al., 2019).

Table 1. Analysis of 20 Scientific Articles on the Application of the Ethnosience Approach in Learning Science

Writer	Research Methodology	Main Findings
Usman et al. (2019)	Research and development (R&D)	The use of modules that contain ethnosience material is proven to improve junior high school students' learning achievement in terms of the substance of the material and its nature.
Yuliana et al (2021)	Quantitative method with Quasi Experimental research	The application of science learning using ethnosience-themed picture books is effective in increasing students' scientific literacy.
Sudarmin et al (2019)	Research and development (R&D)	Innovative teaching materials in the form of student worksheets integrated with ethnosience and green chemistry have proven effective in improving students' critical and creative thinking skill.
Fiteriani et al (2021)	Research and development (R&D)	Learning media innovations in the form of posters integrated with ethnosience are suitable for use in science learning.
Hasanah & Kusumawati (2022)	Research and Development (R&D)	Ethnosience-based digital teaching materials on Jember Authentic Patrol music can be used to support science learning in junior high schools on sound material.
Sulistri et al (2020)	Research and Development (R&D)	Ethnosience-based digital pocket books are effective in increasing students' scientific literacy skills.
Novitasari et al (2017)	Research and development (R&D)	The implementation of culture-based learning "Sedekah Laut" in the Pacitan community can effectively improve the scientific literacy skills of junior high school students in science learning by applying an ethnosience approach.
Sudarmin et al (2020)	Qualitative Method	Taxus Sumatra can act as an anti-cancer drug. The application of ethnosience-laden inquiry learning can explain original and scientific knowledge from Taxus Sumatra which can be used as a cancer drug.
Damayanti et al (2017)	Research and Development (R&D)	Implementation of science learning models with ethnosience can effectively improve student learning outcomes and creativity
Sarwi et al (2020)	Quantitative and qualitative with experimental design	The role of culture in the implementation of science learning with the guided inquiry model applied in the ethnosience approach is effective in increasing scientific literacy skills and developing students' character.
Hikmawati et al (2020)	Quantitative by experiment	The culture of the Sasak tribe in Lombok can be integrated in science learning through an ethnosience approach and is effective in improving

Writer	Research Methodology	Main Findings
		critical thinking skill and a sense of culture concern for junior high school student.
Dewi et al (2021)	Quantitative with quasi experiment	The implementation of ethnoscience-based contextual collaborative learning is able to improve students' content, process and science attitude skills.
Hau et al (2021)	Descriptive qualitative	In the process of making moke there are science concepts that can be transformed into science learning at school.
Ragil et al (2022)	Descriptive Qualitative	The concept of ethnoscience can make students better understand science learning, one of which is in the process of traditional Sumbawa Barodak marriage in learning containing science concepts that can be transformed into science learning at school.
Hadi et al (2019)	Descriptive Qualitative	The original science contained in the process of making Madurese shrimp paste contains scientific concepts that can and can be implemented in Science Learning in Junior High Schools through an ethno-scientific approach to cultivate the value of local wisdom and the character of students.
Pratama et al (2022)	Descriptive Qualitative	Ethnoscience studies in the process of natural dyeing on ulos woven fabrics can be explored as a source of learning natural sciences in junior high schools.
Supriyadi et al (2020)	Descriptive Qualitative	The local wisdom of the Malind tribe can be integrated into scientific knowledge so that it can become a source of learning science in junior high schools on several topics such as heat transfer, physical and chemical changes, measurement, and environmental preservation.
Najib (2018)	Descriptive Qualitative	In ethno-science studies, the process of making roof tiles can be integrated into science learning and can be implemented as a natural science learning resource.
Nuruso et al (2018)	Descriptive Qualitative	Indigenous knowledge from the community in making bricks can be integrated into science learning through an ethnoscience approach.
Ibe & Nwoso (2017)	Quantitative with Quasi Experiments	Ethnoscience-based learning can make students' science process skills better, besides that students are also more active in learning activities.

If we look at the analysis of journal articles in table 1, it is found that an ethnoscientific approach can be obtained from various local wisdoms in Indonesia. This local wisdom can be sourced from the process of making typical products from regions in Indonesia, such as the process of making moke (a typical Flores alcoholic drink), the process of making Madurese shrimp paste, the process of making bricks and the process of coloring the Ulos woven fabric of the Batak tribe. Not only that, the ethno-scientific approach can be studied through the culture or customs of the tribes in Indonesia, such as the *Barodak* traditional wedding procession from the *Samawa* tribe in Sumbawa and the daily culture of the *Malind* tribe in Papua.

The ethnoscientific approach to science learning comes from various local wisdoms or local cultures that can be explored as learning resources. These learning resources can be developed into various teaching materials to support science learning. Based on the analysis of the articles contained in Table 1, various forms of ethnoscience-based learning media were developed as supporting materials, especially in learning science in schools. These learning media include student worksheets, picture books, poster media, digital pocket books and various other types of media.

The role of the ethnoscience approach through collaborating with various models and media as a support for learning science in junior high schools is implemented to help students achieve the learning objectives that have been set. Based on the analysis of the articles in Table 1, applying the ethnoscience approach to learning science plays a positive role in improving the abilities and skills of students. For example, the use of ethnoscience-based worksheets can increase the creativity of students (Andani et al., 2020). In addition, the application of an ethnoscience approach using the guided inquiry model in science learning can improve students' scientific literacy skills.

Many learning innovations have been implemented by researchers, especially in the field of science. One of them is by linking local wisdom or culture found in community groups with science material in schools and packaged through an ethnoscience approach. An important finding in this research is that the implementation of the ethnoscience approach in science learning at the junior high school level has proven effective in improving various cognitive, affective, and psychomotor aspects of students. These aspects include students' thinking skills, scientific processes, literacy, and creativity. In addition, indirectly the implementation of this ethnoscience can foster students' local wisdom values and love for their culture.

## Conclusion

Based on the research results obtained, it can be concluded that the ethnoscience approach has a positive influence on learning science at school. The implementation of ethnoscience can be obtained from various local wisdoms originating from the process of making typical products from regions in Indonesia as well as through the habits or culture of a community group, so that local wisdom can be explored as a source of learning. As a source of learning, the contained scientific knowledge can be developed into various ethnoscience-based learning media. The implementation of the ethno-science approach in science learning is effective in increasing various abilities and skills of students such as thinking skills, problem-solving skills, process skills and scientific literacy.

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