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ETHNOGRAPHY OF SCIENCE: A LITERATURE REVIEW

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Abstrak

Studi tentang bagaimana masyarakat atau kelompok etnis tertentu memandang dan memahami ilmu pengetahuan dikenal sebagai etnosains. Disiplin ini menyelidiki bagaimana berbagai komunitas menggunakan, memahami, dan menafsirkan ilmu pengetahuan. Meskipun sebagian masyarakat mungkin lebih skeptis dan ragu untuk mengadopsi ilmu pengetahuan dan teknologi baru, sebagian masyarakat lainnya mungkin lebih menerima keduanya. Keyakinan, budaya, dan agama mungkin berdampak pada cara masyarakat menerapkan sains. Selain itu, etnosains menyelidiki cara-cara sains mempengaruhi masyarakat. Strategi pendidikan yang disebut etnosains menghubungkan pengetahuan aktual suatu masyarakat dengan pemahaman ilmiah. Ini adalah jenis etnografi baru yang memungkinkan peneliti budaya untuk mengembangkan ide-ide akar rumput berdasarkan etno dan folk tanpa harus menerima teori budaya barat yang mungkin tidak relevan. Etnosains adalah bidang studi interdisipliner yang menggabungkan prinsip-prinsip etnografi dan sains. Bidang ini bertujuan untuk memahami hubungan antara budaya dan ilmu pengetahuan. Artikel ini membahas tentang asal usul etnosains, ruang lingkup bidang kajian etnosains, dan masa depan etnosains. Etnosains mencakup berbagai disiplin ilmu, termasuk antropologi, sosiologi, sejarah, dan filsafat ilmu. Salah satu bidang penelitian utama dalam etnosains adalah studi tentang sistem pengetahuan asli. Etnosains juga mempelajari hubungan antara sains dan agama. Etnosains dapat membantu kita memahami bagaimana pengetahuan ilmiah diproduksi dan digunakan dalam konteks budaya yang berbeda.

Kata Kunci: Etnosains; Etnografi; Ilmu Pengetahuan; Budaya; Kearifan Lokal; Agama.

Abstract

The study of how certain communities or ethnic groups perceive and comprehend science is known as ethnoscience. This discipline investigates how various communities use, comprehend, and interpret science. While some communities could be more skeptics and hesitant to adopt new science and technology, others might be more receptive to both. Beliefs, culture, and religion may all have an impact on how society applies science. In addition, ethnoscience investigates the ways in which science affects society. An educational strategy called ethnoscience links the actual knowledge of a society to scientific understanding . It is a new type of ethnography that allows cultural researchers to develop grassroots ideas based on ethno and folk without necessarily accepting western cultural theories that may be irrelevant.Ethnoscience is an interdisciplinary field of study that combines the principles of ethnography and science. This field aims to understand the relationship between culture and science. This article discusses the origins of ethnoscience, the scope of the field of ethnoscience studies, and the future of ethnoscience. Ethnoscience encompasses a variety of scientific disciplines, including anthropology, sociology, history, and philosophy of science. One of the main research areas in ethnoscience is the study of indigenous knowledge systems. Ethnoscience also studies the relationship between science and religion. Ethnoscience can help us understand how scientific knowledge is produced and used in different cultural contexts.

Keywords: *Ethnoscience; Ethnography; Science; Culture; Indigenous Knowledge; Religion.*

INTRODUCTION

The study of how certain communities or ethnic groups perceive and comprehend science is known as ethnoscience. This discipline investigates how various communities use, comprehend, and interpret science. Studies of ethnoscience also look at how people's beliefs, culture, and religion affect their perceptions of science. The study of ethnoscience is still relatively young, but it is growing as the interplay between science and society gets more intricate. This branch of research evolved from studies in anthropology and sociology to become an interdisciplinary area of study. Ethnoscience investigates the ways in which science is used, seen, and influenced by society, (Aji 2017)

The way that society perceives science is one of the key facets of ethnoscience. Every civilization views science differently, based on its culture, religion, and underlying beliefs. While some communities may see science as harmful and dangerous, others may see it as beneficial and useful. Perspectives held by society toward science can also impact the application of science in society. Ethnoscience investigates the use of science in society as well. Every civilization uses science in a different manner. While some communities could be more skeptics and hesitant to adopt new science and technology, others might be more receptive to both. Beliefs, culture, and religion may all have an impact on how society applies science, (Sudarmin 2019)

In addition, ethnoscience investigates the ways in which science affects society. Technology and science may have a significant influence on society in both positive and negative ways. In certain areas, including health and agriculture, science and technology may enhance people's quality of life. But sometimes, especially in the security and environmental domains, science and technology can have negative effects. To sum up, ethnoscience is a crucial area of research for comprehending how society and science interact. This field looks at how science is used in society, how it is viewed by society, and how it affects society. Moreover, ethnoscience may aid in the development of science and technology that better reflect the values and requirements of society.

Etnosains is an interdisciplinary branch of research that blends ethnographic and scientific ideas. It tries to comprehend the link between culture and science, as well as how scientific information is created, transmitted, and used in various cultural contexts. Koentjaraningrat, an Indonesian anthropologist, created the word "etnosains" in the 1970s (Senadimas, 2017).

An educational strategy called ethnoscience links the actual knowledge of a society to scientific understanding (Sari F. &., 2023). It is a new type of ethnography that allows cultural researchers to develop grassroots ideas based on ethno and folk without necessarily accepting western cultural theories that may be irrelevant. Ethnoscience research on cultural phenomena is always founded on the community's perspective, and it can breathe new life into cultural research (Suprapto, Prahani, & Deta, 2021). Bibliometric analysis provides a methodical way to assess a paper's contribution to the progress of knowledge. (Suprapto, Prahani, & Deta, 2021). Researchers can use bibliometric analysis to identify worldwide trends in ethnoscience research and offer future topics for study (Hidaayatullaah, Suprapto, Hariyono, Prahani, & Wulandari, 2021).

The goal of this literature review is to assess the scientific trend of ethnoscience research using bibliometric analysis and to study Indonesia's contribution to ethnoscience research. The survey will introduce a bibliometric writing assessment to distinguish research patterns on the issue of ethnoscience in science learning. It will also investigate the incorporation of ethnoscience studies into science education. Finally, the paper

willdiscuss ethnoscience research technique and the necessity for alternative epistemologies.

The fundamental question in this research is how previous researchers applied the concept of Ethnoscience. The aim of this research is to describe the application of Ethnoscience theory. From this research, it is hoped that the role of researchers in interpreting the objects studied and the scientific problems of ethnoscience analysis in research can be known.

RESEARCH METHOD

This study employed the literature review technique. In general, the literature review process is used to gather and synthesize past research in a methodical manner. The findings are the result of combining the findings and viewpoints of several studies (Snyder, 2019). This approach is used to investigate the use of Ethnosemiotics. This research employed an integrative or critical evaluation of the literature. The integrative review approach, according to (Snyder, 2019) intends to evaluate the knowledge base, critically review and perhaps reconceptualize, and broaden the theoretical framework of a specific issue.

Data was gathered through searching and gathering various papers on ethnoscience from the Scopus, Sinta, and Tandoffline databases, as well as dissertation research findings. There will be a total of 12 papers examined.

RESULT AND DISCUSSION

Science education that is based on ethnoscience aims to include cultural elements into the study of science. It is feasible to consolidate numerous informative strategies, media, and materials with the use of ethnoscience-based science educating and learning at the homeroom level. Social setting and social information are the primary foci of the assets made for ethnoscience-based science educating and learning. Science training that depends on ethnoscience is firmly attached to everyday exercises. Accordingly, it might help understudies in their investigation of the innate sciences. The coordination of ethnoscience into science training and learning urges understudies to turn out to be more mindful of their sociocultural environmental factors, which thus rouses them to keep up with and advance their own neighborhood culture. According to the backdrop PISA data, pupils' cognitive learning outcomes in science classes are regarded as being below average.

The understudies' failure to analyze and convey different logical issues while giving key understandings to such express ideas, also the translation of testing dynamic ideas relating to the understudies' day to day routine, is one of the components that could add to this. The circumstance emerges because of the understudies' deficient reasoning skills and the science instruction process, which gives little consideration to the understudies' socio-social milieu. The majority of students struggle to apply scientific concepts to their everyday lives and struggle to understand scientific ideas when learning science. Given that science places a strong focus on principles and concepts that are relevant to everyday life, there has to be an attempt to integrate science education with the idea of everyday life.

As it empowers direct perception, which connects with the understudies to distinguish logical issues, make sense of peculiarities deductively, and reach determinations, ethnoscience-based science instructing and learning is remembered to make the educating and educational experience that successfully relates science and day

to day existence. Through ethnoscience-based science education and learning, cultural values are communicated that go beyond local knowledge to include abstract information ingrained in the culture itself. The way of thinking of public activity is a representation of a social worth that might be educated by pushing both nearby information and unique information. To ensure that the social qualities become a piece of the understudies' personality improvement, the materials may be introduced through different learning subjects. Understudies' learning results are improved when the characteristics of logical movement and decisive reasoning abilities are developed in science educating and learning. This is on the grounds that the understudies secure used to fostering these capacities.

Tabel 1. Ethnoscience Research

No	Authors & Year	Research Title	Method	Focus	Findings
1	Zidny & Eilks, 2022	"Learning about Pesticide Use Adapted from Ethnoscience as a Contribution to Green and Sustainable Chemistry Education"	Quasieksperiment	Green Chemistry	The incorporation of indigenous people's (Baduy) culture improves teaching and learning about green and sustainable chemistry. The course was very fascinating and meaningful to the participants in this research individually. Learning chemistry in a practical setting while incorporating concepts and ideals from one's cultural milieu is viewed as a beneficial experience that advances the participant's scientific literacy. Through their comparison and evaluation of the benefits and drawbacks of various extraction techniques, participants have the opportunity to directly encounter the green chemistry concepts and to consider the significance, goals, and benefits of green chemistry.
2	Patricia et al., 2022	"Analysis of Studens' Critical and Creative Thinking Skills on the Application of A Problem-Based Learning Model Contained with Etno-Science (Etno-PBL)"	Quasieksperiment	Chemistry	Understudies' basic and imaginative abilities to reason can develop through issue based science educating and discovering that utilizes an ethnoscience approach. By consolidating the social setting or nearby insight, the ethnoscience technique in issue based educating and learning stresses understudies' dynamic commitment to the educational experience. The educating and growing experience urges understudies to concentrate on more effectively and in a more significant manner, which impressively further develops their basic and imaginative reasoning skills as they completely handle the points.
3	Usman et al., 2019	"Ethno-Science Based Module Development on Material	Quasieksperiment	Natural Sciences	Regarding the materials and its elements, the ethnoscience-based module made by the scientists supposedly is especially appropriate for

		Substance and its Characteristics to Improve Learning Achievement of Junior High School Students"			use in the science educating and educational experience. Further developed gaining results for students result from the utilization of ethnoscience-based educating and learning modules. The ethnoscience-based gaining module got great criticism from the understudies also.
4	Sudarmin et al., 2018	"The Use of Scientific Direct Instruction Model with Video Learning of Ethnoscience to Improve Studens' Critical Thinking Skills"	Quasieksperiment	Chemistry	Students' cognitive capacities and critical thinking are improved by using a direct learning paradigm in conjunction with ethnoscience-based teaching and learning films on colloidal topics. Additionally, when students engage in the instructional process that incorporates ethnoscience-based video, their motivation increases.
5	Nurcahyani et al., 2021	"Ethnoscience learning on science literacy of physics material to support environment"	Meta Analysis	Physics and Environmental Science	The integration of ethnoscience into physics instruction and learning has a big impact on how competent the students are in the cognitive and emotive domains. As per this review, moderately couple of cases of ethnoscience are being utilized in physical science classes. All things considered, ethnoscience is all the more oftentimes utilized in Coordinated Science educating and learning at the rudimentary through middle school levels. The educating and learning of Physical science and Coordinated Science can consolidate neighborhood information and ecological contemplations.
6	Iriani & Kurniasih, 2019	"The Difference in Critical Thinking and Learning Outcome Using Problem Based Learning Asissted with Sasirangan Ethnoscience"	Quasieksperiment	Colloid Chemistry	(1) The group of understudies who are shown colloid materials utilizing the Issue based learning model helped by Sasirangan (ethnoscience) worksheet and the gathering of understudies who are shown colloid materials utilizing informative instructing exhibit altogether unique decisive abilities to reason. (2) The trial bunch beats the benchmark group as far as learning results across the mental, emotional, and psychomotor spaces while utilizing the Issue based Learning model with the guide of the Sasirangan (ethnoscience) worksheet. (3) The students feel that while studying colloidal materials, the problem-based learning approach is superior to the expository teaching and learning approach when aided by sasirangan (ethnoscience) worksheets.
7	Ajayi et al., 2017	"Use of ethnochemistry teaching approach and achievement	Quasieksperiment	Chemistry	With the consideration of ethnochemistry in the educating and growing experience, the understudies' learning brings about science regarding

		and retention of senior secondary students in standard mixture separation techniques"			the matter of blend partition get to the next level. The students' learning outcomes have improved, which is consistent with their increased active participation in the learning process as a result of the ethnochemistry method, which enables them to apply their prior cultural knowledge to challenges in the classroom.
8	Aderonmu & Adolphus, 2021	"Thinking through Ethnoscientific Scenarios for Physics Teaching Implication for Curriculum Implementation"	Quasieksperiment	Physics	The idea that teachers are the ones who carry out the curriculum indicates that they are the main stakeholders who are taken into account while developing and implementing the curriculum. It is additionally resolved that material science educators, in both metropolitan and rustic schools, show physical science as per the prerequisites of the educational program. This includes topics like stationary and moving charges, conservative forces, waves motion without material transfer, and interactions between matter in space and time. Additionally, an ethnoscience method may be used to teach the complete physics curriculum. Integrating local scientific information into the teaching of physics improves both student understanding and motivation to learn the subject.
9	Dike & Rowland, 2020	"Students' Understanding of Sound Energy Using Ethnoscience Based Instruction in Basic Science"	Quasieksperiment	Natural Sciences	The coordination of ethnoscience into science educating and learning improves understudies' logical learning brings about the areas of energy and sound. The learning process clearly benefits from the cultural surroundings. The results also show that there are no differences in gender when it comes to the usage of resources based on culture and the environment in scientific instruction.
10	Utete et al., 2017	"Exploring how modern sciences impede the development of indigenous knowledge (IK)[Ethnoscience and Ethnomathematics] in the Kavango East region: a case study"	Case Study	Natural Sciences and Math	The history of math and science in ethno-mathematics and ethno-science is based on real-world challenges from many different cultures, with references to diverse instances. Every individual's experience learning math and science is unmistakable on the grounds that every individual might relate the cycle to their own living conditions, childhood, foundation, abilities, and interests. Making understudies mindful of how math, science, and culture are entwined with information and manifest as images, language, codes, fantasies, as well as thinking and dynamic strategies, is one of the many benefits that the ethno-math and ethno-science

					approaches accommodate the instructive educational plan framework. Furthermore, ethno-math and ethnoscience instruct understudies about the commitments surprisingly — proficient or visually challenged — to the formation of arithmetic and science as social ancient rarities.
11	Sari. Et al., 2020	"Ethnoscience Studies Analysis and Their Integration in Science Learning"	Literature Review	science literacy	As indicated by the discoveries of the examination, context oriented, cooperative, setting based, direct instructing, issue based, and project-based learning are only a couple of the learning strategies and models that might be joined with ethnoscience learning. According to this study, the use of ethnoscience learning can foster the development of 21st-century abilities including critical thinking, creativity, general science proficiency, concept understanding, character, chemical literacy, and scientific literacy.
12	Sudarmin et al.,2016	"Development of Ethnoscience Approach in The Module Theme Substance Additives to Improve the Cognitive Learning Outcome and Student's entrepreneurship"	research and development (R&D)	learning materials, learning models and research instruments.	According to the research, the ethnoscience (socio-scientific) method may enhance the morals taught in science classes, cultivate students' morals and values, and help society. The processes of conceiving, creating, and executing the research module are sequential. The module's central concept is based on ethnoscience, and it has undergone two rounds of expert evaluation or validation.

In light of the discoveries of the examinations showed over, some data can be acquired, they are: the ethnoscience educating and learning approach gives positive opportunities for growth (Zidny, 2022) (Usman, 2019), the ethnoscience approach fosters understudies' basic and imaginative reasoning abilities (Iriani, 2019) (Patricia, 2022), ethnoscience educating and learning raise understudies' familiarity with the way that science is a social item (Utete, 2017), ethnoscience educating and learning approach increment understudies' inspiration in learning and works on's how understudies might interpret the ideas being educated (Aderonmu, 2021) also, ethnoscience-based educating and learning further develop understudies' learning results on the emotional, psychomotor, and mental areas (Usman, 2019) (Sudarmin, 2018) (Nurcahyani, 2021) (Iriani, 2019) (Dike, 2020) (Ajayi, 2017). The ethnoscience gives the potential open doors to the understudies to foster their imagination, and hence further developing the understudies' inventive and decisive abilities to reason through science instructing and growing experience. The understudies are locked in to be more dynamic in the educational experience by the execution of the ethnoscience-based science educating and advancing as it puts accentuation on conversations and doing tests. The conversation interaction gives open doors to the understudies to share their thoughts and urges the understudies to be more dynamic that it fosters the understudies' inventive reasoning. The

execution of ethnosciencebased science educating and advancing additionally extends the understudies' learning potential in finding their own ideas which is finished through distinguishing neighborhood social qualities as learning materials, coordinating their own ideas or convictions that are established in social science, and creating remarking and critical thinking abilities which lead to the advancement of decisive reasoning abilities (Nurhasnah, Lufri, & Asrizal, 2022). Ethnoscience-based science instructing and advancing additionally further develops understudies' mental learning results. The improvement is related with the viability of ethnoscience-based science educating and learning in expanding understudies' imaginative and decisive reasoning abilities, understudies' science cycle abilities, and understudies' inspiration in taking part in ethnosciencebased educating and growing experience. Furthermore, ethnoscience-based science educating and learning, with its accentuation on logical learning, additionally work with understudies to create selfunderstanding, and subsequently cultivating mindfulness and natural obligation culture (Zidny, 2022). Ethnoscience-based science instructing and advancing additionally furnishes instructors with understanding of information about the way to deal with impart neighborhood astuteness values through science educating and learning (Utete, 2017). Besides, ethnoscience-based science training and learning widen the understudies' vision to see science for what it's worth as well as a significant interaction that can be capable. The ethnoscience-based educating and advancing likewise gives open doors to understudies to be enganged in a perspective to build their own insight.

The part happy, language, and show parts make up the evaluation and approval modules in the subsequent stage. Two validators, speakers and teachers, assess every part of the evaluation module. Every part is comprised of a few components that are remembered for the module's modules and evaluation pointers (Sudarmin, Rebu, Musnowati, & Sumarni, 2016) Ethnoscience can be utilized as a showing asset when joined with culture, unique food varieties, and neighborhood shrewdness of the climate that supports learning materials and the recreation of unique science information with logical science. The ethnoscience approach can be coordinated with different learning models, for example, relevant based, cooperative, direct guidance, issue based, and project-based learning (Sari, Maryati, & Wilujeng, Ethnoscience Studies Analysis and Their Integration in Science Learning: Literature Review, 2023).

The information presented above leads to the conclusion that ethnoscience may be incorporated into the teaching and learning of physics, chemistry, biology, and other integrated natural sciences. Different scientists have a few choices to make ethnoscience-based informative media and modules for science educating and learning since there is no limitation on the assets that might be consolidated with the ethnoscience technique. The production of informative materials and modules is urgent for instructors since it tends to be helpful for genuine application. This is on the grounds that the execution of ethnoscience-based science educating and learning brings significant advantages, particularly in further developing understudies' mental learning results.

CONCLUSION

According to the results, ethnoscience-based science instruction and learning are crucial in helping students improve their problem-solving abilities as they study. By modifying the instructional methods, resources, and media to place more emphasis on students' backgrounds, ethnoscience may be linked with the teaching and learning of the natural sciences. Also, the review's outcomes show that ethnoscience-based science

guidance and learning are effective in cultivating understudies' basic and imaginative reasoning. Conclusion: By empowering understudies to be aware of their own reasoning and answer troubles by fathoming the example fundamental every one, ethnoscience-based science instructing and learning might be utilized to further develop understudies' mental learning results. In view of the discoveries of this review, it is suggested that educators foster basic ethnoscience learning materials for understudies to utilize and that they utilize nearby information from their local area as per the qualities of their understudies to further develop understudy learning results.

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