

Ethnoscience In Science Learning Research Trend: A Systematic Literature Review From 2013-2022

Dimas Fahrudin^{1*}, Sulistyو Saputro², Sarwanto³

¹ Master of Science Education, Sebelas Maret University, Surakarta, Indonesia.

² Department of Chemistry Education Sebelas Maret University, Surakarta, Indonesia.

³ Department of Physics Education Sebelas Maret University, Surakarta, Indonesia.

Received: May 8, 2023

Revised: June 30, 2023

Accepted: August 25, 2023

Published: August 31, 2023

Corresponding Author:

Dimas Fahrudin

dimasfahr@student.uns.ac.id

DOI: [10.29303/jppipa.v9i8.3813](https://doi.org/10.29303/jppipa.v9i8.3813)

© 2023 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: This study aims to explore the development of ethnoscience research in science learning in the period of 2013-2022. The findings obtained are expected to become one of the reference maps for future ethnoscience research in science education. This research employed a systematic review. 151 documents were obtained in their correlation with ethnoscience in science education. The articles from Google Scholar and Scopus databases were collected using Publish or Perish (PoP) software and visualized with the support of the Vosviewer software application. The findings show that in science learning Ethnoscience Research in Science Education was widely published in the journal Physics Conferences, the learning model was dominated by the inquiry model, the research products were related to books, e-books and videos, learning materials were dominated by chemistry subject, while the research subjects were dominated by students at the elementary school and secondary school levels. The implementation of ethnoscience learning in science learning impacts the students' critical and analytical thinking skills, science process skills, scientific literacy, conservation and environmental care attitudes, and good attitudes. Local wisdom implemented in science learning comes from a local culture interpreted ethically.

Keywords: Ethnoscience; Science Learning; Systematic Review

Introduction

Educational problems in Indonesia are increasingly complex by the times. The demands of the 21st century students' abilities are in contrast to the disparity in the distribution of the educational quality in various regions in Indonesia. The facilities and quality of education in big cities are certainly different from those in border areas. Furthermore, economic factors and economic disparities between families greatly affect the learning facilities each student gets (Kawuryan et al., 2021; Muttaqin, 2018). The sociocultural background influences curriculum policies and programs that differ in each region and the diverse topographical conditions of Indonesia's territory challenges the government and education practitioners to keep providing quality education services to support the growth of superior Indonesian resources (Nihayah et al., 2020).

Resulting from the diverse sociocultural backgrounds, the potentials of moral and character degradation has clearly occurred to students, for instance free sex, drugs, and the issue of environmental damage, in Indonesia (Saidek et al., 2016). The students' love for their own nation and their own culture is another important thing to consider. The rapid development of information and communication technology may bring negative impact and threaten local cultural character values. Considering the problems and challenges in education in Indonesia, the government focuses on improving the abilities of students in accordance with the demands of the 21st century and strengthening as well as trying to internalize local cultural characters so that it is expected to have students with the personality of the nation's local cultural values but also the ability to compete in global community.

How to Cite:

Fahrudin, D., Saputro, S., & Sarwanto. (2023). Ethnoscience In Science Learning Research Trend: A Systematic Literature Review From 2013-2022. *Jurnal Penelitian Pendidikan IPA*, 9(8), 458-467. <https://doi.org/10.29303/jppipa.v9i8.3813>

Facing these challenges, many practitioners and researchers in the field of education have been looking for solutions to improve 21st century ability and maintain the local cultural values of the Indonesian nation. The ethnoscience learning paradigm emerged as an effort to answer the challenges of the diversity of students' sociocultural backgrounds. Students' background and environmental conditions are important in the implementation of learning. Sociocultural background can be a provision for teachers to apply learning methods that are in accordance with the characteristics of students, while the student environment can be optimized as a learning resource (Ardianti et al., 2019; Atmojo et al., 2019).

Several studies related to the systematic literature review of ethnoscience have been carried out by several researchers. Kasi (2021) comprehensively conducted review related to ethnoscience in science learning in the period of 2010-2020, which includes methods, subjects, effects, analysis, data collection tools, and topics in researched ethnoscience locations (Kasi et al., 2021). Wati (2021) made a recommendation for future ethnoscience researches by reviewing ethnoscience studies in science learning in 2015-2020 (Wati et al., 2021). Nurcahyani (2021) conducted a meta-analysis on the subject of physics and its impact on students' scientific literacy. The recommendation from this research is in the form of material development. Physics material from local knowledge sources is essential to improve students' scientific literacy and students' attitudes (Nurcahyani et al., 2021). Widyawati (2020) conducted a literature review related to the development of online-based student worksheets in developing students' critical thinking skills. The selected articles are limited in the year of 2010-2020 with the results of research recommendations, namely the digitization of local science-based learning materials and instruments which is essential to prepare students in the industrial era 4.0 (Widyawati & Sujatmika, 2020).

Considering the prior studies, it shows that the study literature or meta-analysis related to ethnoscience and several subtopics in science learning have been studied from several aspects such as different subjects, types of ethnoscience integrated, the period of publication of the article, and the impact of ethnoscience on students' thinking abilities and positive attitudes. This study aims to identify the application of ethnoscience in science learning in biology, physics, and chemistry. Systematic analysis of the literature review in this research is very crucial to build a framework to provide the description of ethnoscience research in science learning that can be used as a reference for future research on ethnoscience topics in science learning (Kuzior & Sira, 2022). It attempts to provide, among

others, the results of the analysis related to trends and opportunities for future ethnoscience publications, the writers who are most active in publishing ethnoscience in science learning, the journals or proceedings that provide ethnoscience articles in science learning, and the studies on the impact of applying ethnoscience in science learning for students in elementary school to university level (Abd Majid et al., 2022; Hidaayatullaah et al., 2021).

Ethnoscience

Ethnoscience is etymologically derived from the word "ethno" which means ethnicity and "science" which means knowledge. Accordingly, ethnoscience can be referred as a science that exists in ethnicity. The ethnoscience paradigm views culture with ethical and emic principles, in which the emic point of view refers to the cultural or societal point of view while etic refers to the scientific point of view (Sturtevant, 2009). Ethnoscience does not immediately appear but emerges from various processes of trial-and-error experiences which are carried out continuously and passed down from generation to generation until the ethnicity is able to mark an event which later becomes its belief which is called local knowledge (Barboza et al., 2007; Torrens & Castellano, 2021). Ethnoscience products related to science learning in ethnic communities can be in the form of fine arts, dance, music, and drama. Alternative medicine, weather forecast, and 3endid or agricultural technology is also related to Ethnoscience (Habibillah et al., 2020; Izzah et al., 2020; Torrens & Castellano, 2021). Various ethnoscience products can be used as learning resources for students through a process of reconstruction and scientific explanation of several ethnoscience products linked to science learning.

Science Learning

Science education in Indonesia is broadly divided into Biology, Physics, and Chemistry. At the junior high school level, science education is integrated into one referred as integrated science. Science education in Indonesia seeks to introduce students to nature and how it works. Science educators become a bridge to improve critical thinking skills, the ability to analyze natural phenomenon. Natural science is formed from the interrelation of curiosity and scientific processes, investigations of natural phenomenon, and scientific products (Carin & Sund, 1985; Datta, 2018). In addition to the encouraging attitudes to understand natural phenomenon, individuals' determination and patience are also needed for the science learning process which continues to foster curiosity in order to obtain the answers of what they want to learn (Chowdhury, 2016; Larimore, 2020). Science is a body of knowledge that is

formed through a continuous process of inquiry directed by people engaged in science (Cairns, 2019). Science is not only knowledge but also a human endeavor including mental operations, skills and strategies in manipulating and calculating curiosity, courage, persistence carried out by individuals to know and respond the phenomenon happened. In conclusion, science can also be referred as things that are conducted by scientists in carrying out scientific investigation.

Method

This study employed systematic literature review by using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analysis) method which was carried out in systematic stages according to predetermined stages or protocols (Wolor et al., 2021; Zhang et al., 2020). This study consists of the following steps Figure 1. Consist of (1) formulating the research questions, (2) conducting a systematic literature review search, (3) selecting articles according to the selection criteria, (4) performing qualitative analysis and data extraction findings, (5) controlling the quality of article findings, and (6) synthesizing data and preparing reports (Linnenluecke et al., 2019; Perry & Hammond, 2002; Wahono, 2015).

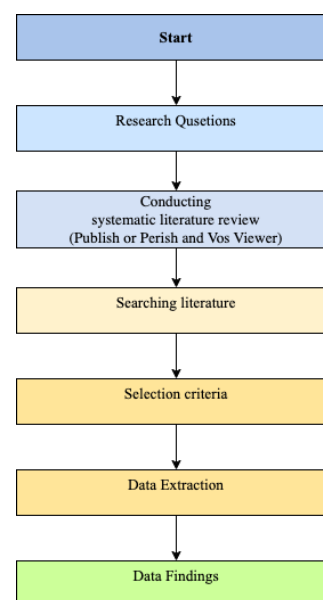


Figure 1. Prisma Systematic literature review models (Linnenluecke et al., 2019; Perry & Hammond, 2002; Wahono, 2015).

A qualitative approach was used to carry out the data analysis and provide solutions to answer the formulated research questions. After an in-depth analysis process was carried out, several articles were selected as the main articles in compiling a framework for answering research questions (Table 1) related to ethnosience in science education which were written from different perspectives by several different authors.

Table 1. Research Question

ID	Research question	Answer
RQ 1	What is the trend of annual publications in the field of Ethnosience in learning in 2013-2022?	Knowing the increase and decrease in ethnosience publications in 2013-2022 learning.
RQ 2	Who were the most active authors in ethnosience research in science education in 2013-2022	Identifying the authors who frequently published articles on the topic of ethnosience in science learning
RQ 3	What journals were the most related to ethnosience in Science Learning Education in 2013-2022	Identifying the journals that were most significant in ethnosience research area
RQ 4	What articles were the most cited articles published in academic journals in 2013 and 2022	Identifying the most cited articles in publications with the theme of ethnosience in science education in 2013-2022
RQ 5	What are the most frequent research sub-topics (Research trends) chosen in ethnosience in Science Education in 2013-2022	Identifying the research sub-topics that most often appear in ethnosience research in science education
RQ 6	What are the impacts from ethnosience research in 2013-2022	Identifying the impacts of ethnosience research in science education
RQ 7	Which countries contributed the most to publishing ethnosience articles in science education in 2013-2022	Identifying the countries that contributed the most to ethnosience publications in science education in 2013-2022

Bibliometric analysis was also applied in this study with the aim of measuring the development of published articles and the scientific contribution of the research trends (Donthu et al., 2021; Wati et al., 2021).

Bibliometric analysis demands a coherent, systematic, and detailed method. There are five stages used in bibliometric analysis, namely 1) determining the search keywords, 2) finding the initial search results, 3) perfecting the search results, 4) finding the initial

statistical data, 5) analyzing the data. These steps aim to get the pattern and frequency of the published article citations. The bibliometric analysis in this study only focused on the publication of articles in journals and proceedings.

The application employed in this research was Publish or Perish (PoP) (Rafidhi et al., 2023). PoP is a software program that can retrieve and provide academic citations in Scopus, Google scholar, and Web of science databases. The article data obtained from search results using PoP were then be displayed using Mendeley. Furthermore, to answer several research questions such as author density and research trends, VOSviewer software was employed to assist. The Vosviewer application is able to visualize the publication data with certain topics so that a systematic literature review analysis can be carried out more sensitively but still comprehensively and in-depth (Gunawan et al., 2022; Hamidah et al., 2020).

Searching for Literature

This research was conducted in November-December 2022. Article searches were based on keywords: Ethnoscience and Science Learning. The article databases used in this research were Scopus and Google Scholar. Several adjustments were made manually to maintain the consistency of the articles to fit the criteria and minimize the possibility of research bias.

Selection criteria

The inclusion criteria used in this literature review included the articles written in English, published in the 2017-2022 period, and focusing the issue on ethnoscience in science learning. After the articles were gathered using the Publish or Perish software, the articles were then analyzed to obtain the relevant articles. Analysis and synthesis were carried out in a qualitative descriptive manner to observe, describe, classify, and synthesize new insight that was explored through meta-synthesis. Therefore, meta-analysis can produce new concepts through content synthesis which results in new, beneficial information in education and research, specifically in ethnoscience in science learning.

Data Extraction

The research theme is used as a reference for extracting data that has been collected as the data to answer the research questions. Research quality can be used to interpret and synthesize to determine the conclusions and answer the questions. Figure 2 shows the article extraction flowchart.

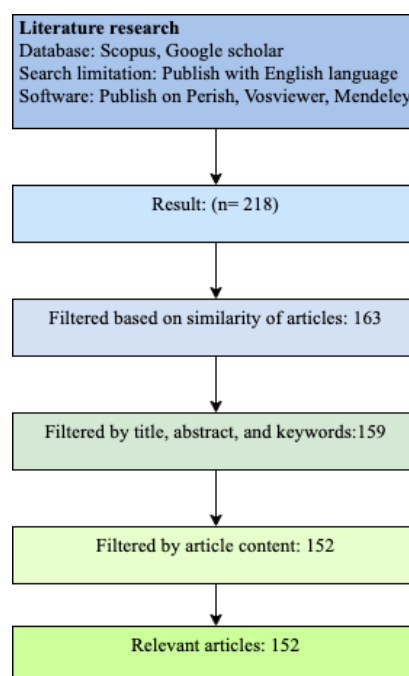


Figure 2. The Article extraction flowchart

Result and Discussion

Based on a digital search assisted by Publish or Perish software, a total of 218 were found in the Google Scholar and Scopus databases. A total of 55 articles were excluded from the data search results due to their duplications that the remaining were 163 articles. After excluding the duplication of the articles, the inclusion criteria for the title, abstract, and keywords were employed. From this process, 2 articles in Indonesian were excluded. Thus, the remaining were 159 articles. After an in-depth review, there were 151 articles that met the inclusion criteria. The results of this study are presented in 7 sections including the number of publications with the title of ethnoscience in learning in each year, author density, the most cited papers, the top 10 journals that most often apply ethnoscience research in learning.

Distribution of Publications in ethnoscience in science learning by Year 2013-2022.

The first question is analysed in Figure 2. Figure 2 reflects the development of ethnoscience publications in science learning from January 2013 to December 2022. Taking into account the annual volume of research on Ethnoscience in science learning, the results of the analysis show that the number of papers in this field has fluctuated. The peak of publications in Ethnoscience research in learning natural sciences occurred in 2021, in which the total number of published articles was 43 papers. In 2013, it was disclosed that there was no published article in scientific journals, and then there

was a rapid growth in 2019, with a total of 27 papers. However, in 2020, the articles reviewed decreased by 6% before increasing by a total of 22% in 2017. The increasing trend of ethnosience publications in science learning began in 2017 and consistently increased and decreased but less than the number of publications in 2017. In particular, there were 139 publications, 87% of the total publications between 2018 and 2022. If analyzed by year, until 2022, the number of publications in this field was 32 papers and researchers predict that this topic will continue to receive attention from researchers in the field of education. Since there is an urgent need to improve and integrate local character and values into science learning in pedagogical content, learning media, and learning resources, it is likely that there will be more publications in the field of ethnosience in science learning in the future.

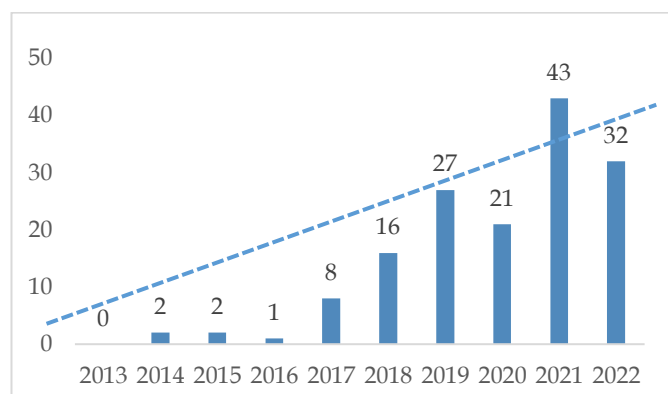


Figure 3. Distribution of Ethnosience research by year of publication

Density of researchers in the field of ethnosience in science learning.

Ethnosience research in science education began to be widely discussed in 2017. Thus, this article discusses ethnosience publications from 2017 to 2022. Researchers who publish the most articles with the theme of ethnosience in science learning need to be identified as an expertise that can be used as research sources or references furthermore. The vosviewer application helps visualize the researchers who published the most research on ethnosience topics in Science Education.

Figure 4. shows that there are 17 researchers who emerged from the search results with the subject of ethnosience in science learning. Sudarmin, S has the brightest picture compared to other researchers which means that he published the most articles on ethnosience in Science Education, namely 19 papers. Then, Sumarni, W is with 11 papers and followed by Sarwi, S with 9 papers. The papers published by Sudarmin, Sumarni, and Sarwi can be used as an accurate reference for future researchers. The next 16

researchers may have the similar publication frequency ranged between 3 and 5 papers.

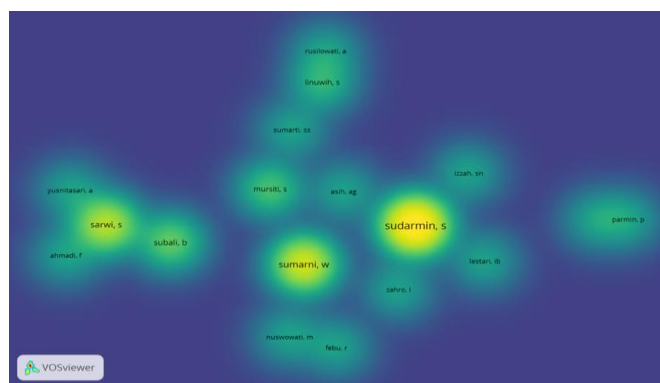


Figure 4. Researchers who published the most ethnosience articles in science learning

Number of publications by journal

The research questions were analysed in Table 2. Table 2 provides the summary of the top 10 academic journals with the highest number of papers from 2013 to 2022.

Table 2. Number of publications by journal

Rank	Journal	Number of Articles
1	Journal of Physics: Conference Series	36
2	Science Education Research Journal	8
3	Primary education journal	7
4	International Journal of Science Education	4
4	IOP Proceedings	4
4	AIP Proceedings	4
5	Turkish Science Education	3
5	Unnes Science Education Journal	3
5	Journal of Indonesian Science Education	3

Table 2 depicts the 10 most cited papers in Ethnosience in science learning research between 2013 and 2022. The number of citations was obtained from the Springer database. To answer the research questions, papers are then sorted based on the highest number of citations in the field of Ethnosience in Science learning. Analysis of the findings shows that ethnosience research is dominated by researchers from Indonesia. Ethnosience researchers in science education published articles in international conferences which were then published in the Journal of Physics: Conference Series. A total of 36 articles with the theme of ethnosience and science learning have been published in the journal in the period of 2013-2022, followed by Science Education

research journals with 8 articles, primary education journals with 7 articles, and several other journals with an average of 3-4 articles.

discussed in ethnoscience research. The Vosviewer application helps visualize research sub-topics that often appear related to ethnoscience in science education in 2013-2022.

Density of the Research Sub Topics

The answer to the fifth research question tries to identify the research sub-topics that are most frequently

Table 3. Most cited papers in Ethnoscience in science learning research between 2013 and 2022

Rank	Cites	Authors	Years	Title
1	71	Abonyi, OS, Achimugu, L., & Njoku, M.	2014	Innovations in Science and Technology Education: A case for ethnoscience based science classrooms
2	62	Fasasi, RA	2017	Effects of ethnoscience instruction, school location, and parental educational status on learners' attitude towards science
3	60	CA Dewi, Y Khery, M Erna	2019	An ethnoscience study in chemistry learning to develop scientific literacy
4	37	Ardianti, SD Wanabuliandari, S, Saptono, S, Alimah, S	2019	A needs assessment of an edutainment module with an ethnoscience approach oriented to the love of the country
5	30	S Sudarmin, R Febu, M Nuswowati, W Sumarni	2017	Development of Ethnoscience approach in the module theme substance additives to improve the cognitive learning outcome and student's entrepreneurship
5	30	M Fitria, AW Graduated	2018	The Development of Ethnoscience-Based Chemical Enrichment Book as a Science Literacy Source of Students
6	26	I Ebere, AN Apollonia	2017	Effects of Ethnoscience and traditional laboratory practical on science process skills acquisition of secondary school biology students in Nigeria
7	25	S Rahmawati, B Subali, S Sarwi	2019	The Effect of Ethnoscience Based Contextual Learning Toward Students' Learning Activity
8	24	A Khoiri, N Nulngafan, W Sunarno, Sajidan	2019	How Are Students' Creative Thinking Skills? An Ethnoscience Learning Implementation
9	21	H Hikmawati, IW Suastra, NM, Pujani	2021	Ethnoscience-Based Science Learning Model to Develop Critical Thinking Ability and Local Cultural Concern for Junior High School Students in Lombok

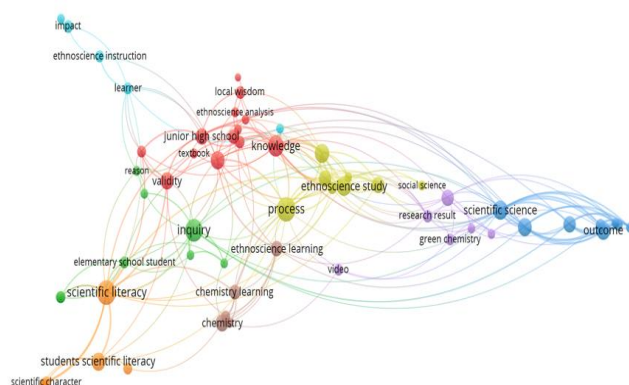


Figure 5. The most frequently researched research topics in the field of ethnoscience in science learning

In figure 5, research topics with yellow keywords are the most frequently researched topics, while the dimmer indicates the research topics that are rarely studied. Research topics that have often been studied are related to ethnoscience with inquiry learning model while the subject matter that is most often linked is learning chemistry. The learning media used in this research topic are videos and textbooks. The learning outcomes that are simultaneously measured are the students' scientific literacy and character. Last, the most frequent research subjects are students at the elementary school and junior high school levels.

The Most Valuable Paper in Ethnoscience in Science learning Studies

Table 3 visualizes the 9 most cited papers in Ethnoscience in science learning research between 2013 and 2022. As a note, the number of citations was obtained from the Springer database. To answer the

research questions, papers are then sorted based on the highest number of citations in Ethnoscience in science learning

The Most Productive Country in Ethnoscience publications in science learning.

Aiming to identify the countries that have the most active role in publications in the field of ethnoscience in learning, the data were analyzed manually by reviewing one article at a time. Table 4 presents the top countries with the number of published articles on ethnoscience research in science learning around the world in the period of 2013 to 2022.

Table 4. Rank of publication in by country

Ranking	Country	N of Paper	Percentage (%)
1	Indonesia	144	94.7
2	Nigeria	6	4
3	Dutch	2	1.3

The impacts of ethnoscience research in science learning.

Considering the results of the selected studies, there are several impacts in science learning applications associated with ethnoscience. Before examining each paper, the VOSviewer helped answer this question. Based on Figure 5, it shows that the application of ethnoscience in science learning has an impact on scientific literacy and conservation attitude (Table 5).

The current study succeeded in presenting a comprehensive view of the previous literature and some possible directions for researchers and educators to further study Ethnoscience in science learning. As a result, it is clear that there is an increase in the number of publications related to Ethnoscience in science learning for years. The current findings are in line with the previous studies. For instance, Kasi et al (2021) conducted a Thematic Review of Ethnoscience exploration in Science Education in Indonesia on 71 publications related to ethnoscience in science learning in the period of 2010-2020 and reported that there was a gradual increase in publications for years(Kasi et al., 2021). Furthermore, Wati (2021) made a study review and provide recommendations for future ethnoscience research through research on ethnoscience studies in science learning from 2015-2020 with 26 articles (Wati et al., 2021). Then, Nurcahyani (2021) who conducted a review of 15 articles in the period of 2015-2020 show that ethnoscience research trends are increasingly scrutinized for years. As depicted in figure 1, this study shows that Ethnoscience research in science learning has received great attention from researchers and educators around the world over the last decade. Thus, the number of publications on ethnoscience in science learning is

predicted to increase significantly throughout the year (Nurcahyani et al., 2021).

Table 5. The frequency of side impacts on the implementation of ethnoscience in 2013-2022

Aspect	Impact	Frequency	
Affective	Conservation attitude	9	
	Scientific attitude	6	
	Cultural caring attitude	4	
	Hard work	2	
	Islamic values	2	
	Patriotism	1	
	Cooperative attitude	1	
	Persistence	1	
	Responsibility	1	
	Psychomotor	Science literacy	18
		Critical thinking ability	17
Creative Thinking		3	
HOTS-based thinking		3	
Life skills 2		3	
Pedagogical skills		3	
Innovative thinking		2	
Student learning activities		2	
Environmental literacy		2	
21st Century Literacy		2	
Problem Solving		2	
Citizen Literacy	1		
Interpersonal Intelligence	1		
Science process skills	1		

Regarding the second research question, this study shows that the most prolific writers are Sudarmin, Sumarni, and Sarwi. The three researchers have the most striking colors in the images visualized in Vosviewer. The productivity of these researchers is also proportional to the number of articles cited from their publications. Sudarmin and Sumarni are included in the table list of the most cited articles. Thus, it shows that the two researchers did not only published articles in great numbers but their papers also had good quality.

According to the number of publications by journals, Journal of Physics: Conference Series is the most productive journal in ethnoscience research in science learning with 36 publications. The possible reason is that most researchers in Indonesia submit their articles to Scopus indexed international conferences and then publish them on Journal of Physics: Conference Series. Furthermore, science education research journals and primary education journals were likely to be the two journals that have high productivity in publishing articles on ethnoscience in science learning, each with 8 and 7 articles. The Science Education research journal provides 4 publications in 1 year and collaborates with the Indonesian Science Educators Association. Additionally, the primary education journal also works with the Indonesian PGSD lecturer association so that it attracts attention of ethnoscience researchers in

Indonesia in recent years.

Regarding the fourth research question, it was found that the articles published by Abonyi, OS, Achimugu, L., & Njoku, M. In 2014, Nigeria has 71 citations. Based on the publication trend in table 1, it shows that in 2014 only 2 articles with the theme of ethnosience in science learning were published. Thus, it can be seen that the article is a primary article or the first article so that it is widely cited by researchers in subsequent years. The next 2 articles are from Fasasi, RA and CA Dewi, Y Khery, M Erna with 62 and 60 citations respectively. An article by Fasasi, RA was published in the international journal of science education in 2017. The journal is a leading journal in science education research in the world. It is proven by its consistency in obtaining 1st quartile for the last 2 decades. The credibility and quality of Fasasi's article makes it an original reference in ethnosience research. Article by CA Dewi, Y Khery, M Erna, published in the Indonesian Science Education journal. The journal is a leading journal in the field of science education in Indonesia,

Related to the research sub-topics on ethnosience research in science learning, the findings can be used as a reference for future researchers to examine the areas that are rarely studied. Subsequent research can use the learning models besides inquiry such as discovery, project-based learning, problem-based learning, etc. Meanwhile, the learning media can be in the form of electronic products such as e-books, learning management systems, applications, websites, virtual reality, Augmented reality, motion graphics, and others. Furthermore, ethnosience research on biology and physics subjects still has many opportunities to be further studied. Research with student subjects at the high school and tertiary level also has enormous opportunities to be studied.

Regarding the impact of the implementation, it is divided into the impact on the affective aspect or attitude and the psychomotor aspect or skills. According to ethnosience researchers in science learning, these two impacts are very important for students in the 21st century. Based on the results of the study, it shows that the most dominant effects of the psychomotor category in the period of 2013 to 2022 are scientific literacy and critical thinking. The massive efforts to increase scientific literacy are motivated by Indonesia's low PISA score in the global literacy. Meanwhile, critical thinking skills are the demands of the developed world to prepare students to face the future. Furthermore, the affective impact is dominated by conservation and scientific attitudes. Ethnosience is closely related to culture and nature conservation, so conservation attitudes are considered very suitable to be empowered through learning based on ethnosience. Based on these

findings, research opportunities in ethnosience in science learning are still widely open for several other impacts.

According to the most productive authors, the country with the highest productivity in ethnosience research in science learning is Indonesia, followed by Nigeria, and the Netherlands in the third place. The varied culture and problems of environmental preservation have driven the intensity of ethnosience publications in learning natural sciences in Indonesia. Referring to the number of ethnosience publications in each year, ethnosience research in science learning will potentially be studied in 2023.

Conclusion

In conclusion, the results of a review of 152 ethnosience articles on science learning on articles published in the period of 2013-2022 show that this research continues to grow for years. The graphic of ethnosience publications in science learning shows an increasing graph by number of publications, most in 2021 and 2022. The most productive researchers in publishing this article are consists of three researchers. In line with the origin of the three most productive researchers, Indonesia dominated publications in the last 10 years with a total of 94% of the total publications. Meanwhile, the journal that most frequently publishes ethnosience articles in science education is the Journal Physics of Conference series. Furthermore, the articles with the most citations were obtained by articles in 2014 from Nigeria who ranked first with 71 citations, followed with 62 citations in 2017 from Nigeria and in 2019 with 60 citations from Indonesia. Lastly, the impacts of ethnosience publications in science learning is dominated by affective impacts in the form of conservation and scientific attitudes while the psychomotor impacts in the form of scientific literacy and critical thinking skills.

Acknowledgments

Thank you to the Education Fund Management Institute, Ministry of Finance of the Republic of Indonesia (LPDP RI) for providing education and research funds so that the research articles were completed.

Authors Contribution

Dimas Fahrudin: Systematic literature review using publish or perish and os viewer. writing-original draft preparation, result, discussion; Sulistro saputro and Sarwanto methodology, analysis, review discussion, editing and conclusion.

Funding

Indonesia Endowment Fund for Education (LPDP) with contract letter number KEP.968/LPDP/LPDP.3/2021

Conflicts of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

- Abd Majid, M. Z., Kasavan, S., & Siron, R. (2022). Bibliometric analysis and science mapping of global scientific publications on technical vocational education training (TVET). *Library Hi Tech*. <https://doi.org/10.1108/LHT-12-2021-0485>
- Ardianti, S. D., Wanabuliandari, S., Saptono, S., & Alimah, S. (2019). A Needs Assessment of Edutainment Module with Ethnoscience Approach Oriented to the Love of the Country. *Jurnal Pendidikan IPA Indonesia*, 8(2), 153–161. Retrieved from <https://journal.unnes.ac.id/nju/index.php/jpii/article/view/13285>
- Atmojo, S. E., Kurniawati, W., & Muhtarom, T. (2019). Science Learning Integrated Ethnoscience to Increase Scientific Literacy and Scientific Character. *Journal of Physics: Conference Series*, 1254(1). <https://doi.org/10.1088/1742-6596/1254/1/012033>
- Barboza, R. R. D., Souto, W. de M. S., & Mourão, J. da S. (2007). The use of zootherapeutics in folk veterinary medicine in the district of Cubati, Paraíba State, Brazil. *Journal of Ethnobiology and Ethnomedicine*, 3. <https://doi.org/10.1186/1746-4269-3-32>
- Cairns, D. (2019). Investigating the Relationship Between Instructional Practices and Science Achievement in an Inquiry-Based Learning Environment. *International Journal of Science Education*, 41(15), 2113–2135. <https://doi.org/10.1080/09500693.2019.1660927>
- Carin, A. A., & Sund, R. B. (1985). *Teaching modern science* (4th ed.). Charle E. Merrill Publishing Co.
- Chowdhury, M. (2016). Emphasizing Morals, Values, Ethics, And Character Education in Science Education and Science Teaching. *The Malaysian Online Journal of Educational Science*, 4(2), 1–16. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1095995.pdf>
- Datta, R. K. (2018). Rethinking environmental science education from indigenous knowledge perspectives: an experience with a Dene First Nation community. *Environmental Education Research*, 24(1), 50–66. <https://doi.org/10.1080/13504622.2016.1219980>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to Conduct a Bibliometric Analysis: An Overview and Guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Gunawan, B., Ratmono, B. M., Abdullah, A. G., Sadida, N., & Kaprisma, H. (2022). Research Mapping in the Use of Technology for Fake News Detection: Bibliometric Analysis from 2011 to 2021. *Indonesian Journal of Science & Technology*, 7(3), 471–496. <https://doi.org/10.17509/ijost.v7i3>
- Habibillah, N. K. N., Winarto, & Wicaksono, A. G. (2020). The Pranata Mangsa in the Perspective of an Ethnoscience Approach as Natural Science Teaching Materials in Elementary Schools. *The 3rd International Conference on Technology, Education, and Social Science 2020 (The 3rd ICTESS 2020)*, 459–467. Retrieved from <https://ejournal.unisri.ac.id/index.php/proictss/article/view/5057>
- Hamidah, I., Sriyono, & Hudha, M. N. (2020). A Bibliometric Analysis of Science & Technology. *Indonesian Journal of Science & Technology*, 5(2), 209–216. <https://doi.org/10.17509/ijost.v5i2.24522>
- Hidaayatullaah, H. N., Suprpto, N., Hariyono, E., Prahani, B. K., & Wulandari, D. (2021). Research Trends on Ethnoscience based Learning through Bibliometric Analysis: Contributed to Physics Learning. In *Journal of Physics: Conference Series*, 2110(1), 012026. <https://doi.org/10.1088/1742-6596/2110/1/012026>
- Izzah, S. N., Sudarmin, S., & Prasetyo, A. P. B. (2020). Identification of the indigenous science concepts in the batik-manufacturing process to develop STEM integrated ethnoscience learning. *Journal of Physics: Conference Series*, 1567(042032), 1–6. <https://doi.org/10.1088/1742-6596/1567/4/042032>
- Kasi, Y. F., Samsudin, A., Widodo, A., & Riandi. (2021). A Thematic Review on Exploring Ethnoscience in Science Education: A Case in Indonesia. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, 6(2), 229–241. Retrieved from <http://103.88.229.8/index.php/tadris/article/view/9509>
- Kawuryan, S. P., Sayuti, S. A., Aman, & Dwiningrum, S. I. A. (2021). Teachers Quality and Educational Equality Achievements in Indonesia. *International Journal of Instruction*, 14(2), 811–830. <https://doi.org/10.29333/iji.2021.14245a>
- Kuzior, A., & Sira, M. (2022). A Bibliometric Analysis of Blockchain Technology Research Using VOSviewer. *Sustainability (Switzerland)*, 14(13). <https://doi.org/10.3390/su14138206>

- Larimore, R. A. (2020). Preschool Science Education: A Vision for the Future. In *Early Childhood Education Journal*, 48(6), 703-714. <https://doi.org/10.1007/s10643-020-01033-9>
- Linnenluecke, M. K., Marrone, M., & Singh, A. K. (2019). Conducting systematic literature reviews and bibliometric analyses. *Australian Journal of Management*, 45(2), 175-194. <https://doi.org/10.1177/0312896219877678>
- Muttaqin, T. (2018). Determinants of Unequal Access to and Quality of Education in Indonesia. *Jurnal Perencanaan Pembangunan The Indonesian Journal of Development Planning*, 2(1), 1-23. Retrieved from <https://unnes.ac.id/berita/diapresiasi-publik-raeni-peroleh-tawaran-beasiswa-s2-ke-inggris/>
- Nihayah, R. W., Revina, S., & Usman, S. (2020). Sociocultural Drivers of Local Educational Innovations: Findings from Indonesia. *Research on Improving Systems of Education (RISE) Working Paper*, 20. https://doi.org/10.35489/BSG-RISE-WP_2020/043
- Nurcahyani, D., Yuberti, Irwandani, Rahmayanti, H., Zajuli, I., Ichsan, & Rahman, Md. M. (2021). Ethnoscience Learning on Science Literacy of Physics Material to Support Environment: A Meta-analysis Research. *Journal of Physics: Conference Series*, 1796(012094), 1-8. <https://doi.org/10.1088/1742-6596/1796/1/012094>
- Perry, A., & Hammond, N. (2002). Systematic reviews: The experiences of a PhD student. *Psychology Learning and Teaching*, 2(1), 32-35. www.cochrane.org
- Rafdhi, A. A., Soegoto, E. S., Hayati, E. N., Saputra, H., Mega, R. U., & Rifaldi, M. I. (2023). Economic Growth and Its Influence on Environment Sustainability: *Journal of Eastern European and Central Asian Research*, 10(1), 125-134. Retrieved from <https://ieeca.org/journal/index.php/JEECAR/article/view/1071>
- Saidek, A. R., Islami, R., & Abdoludin. (2016). Character Issues: Reality Character Problems and Solutions through Education in Indonesia. *Journal of Education and Practice*, 7(17), 158-165. Retrieved from <https://eric.ed.gov/?id=EJ1108663>
- Sturtevant, W. C. (2009). Studies in ethnoscience. *American Anthropologist*, 6(3), 99-131. <https://doi.org/10.1525/aa.1964.66.3.02a00850>
- Torrens, F., & Castellano, G. (2021). Ethnoscience, Alternative Medicine, Inflammation, and Pain Models. In *Natural Products Pharmacology and Phytochemicals for Health Care*, 133-145. <https://doi.org/10.1201/9781003057932-9>
- Wahono, R. S. (2015). A Systematic Literature Review of Software Defect Prediction: Research Trends, Datasets, Methods and Frameworks. *Journal of Software Engineering*, 1(1), 1-6. Retrieved from <https://journal.ilmukomputer.org/index.php?journal=jse&page=article&op=view&path%5B%5D=47>
- Wati, E., Yuberti, Saregar, A., Fasa, M. I., & Aziz, A. (2021). Literature Research: Ethnoscience in Science Learning. *Journal of Physics: Conference Series*, 1796(012087), 1-9. <https://doi.org/10.1088/1742-6596/1796/1/012087>
- Widyawati, A., & Sujatmika, S. (2020). Electronic student worksheet based on ethnoscience increasing hot: literature review. *International Conference on Technology, Education and Sciences (InCoTes)*, 27-31. Retrieved from <https://jurnal.ustjogja.ac.id/index.php/incotes/article/view/9538>
- Wolor, C. W., Nurkhin, A., & Citriadin, Y. (2021). Leadership style for millennial generation, five leadership theories, systematic literature review. *Quality - Access to Success*, 22(184), 105-110. <https://doi.org/10.47750/QAS/22.184.13>
- Zhang, X., Tan, R., Lam, W. C., Yao, L., Wang, X., Cheng, C. W., Liu, F., Chan, J. C. P., Aixinjueluo, Q., Lau, C. T., Chen, Y., Yang, K., Wu, T., Lyu, A., & Bian, Z. (2020). PRISMA (Preferred reporting items for systematic reviews and meta-analyses) Extension for Chinese Herbal Medicines 2020 (PRISMA-CHM 2020). *American Journal of Chinese Medicine*, 48(6), 1279-1313. <https://doi.org/10.1142/S0192415X20500639>