Literature Research: Ethnoscience in Science Learning

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Abstract. The purpose of this research was to provide a bibliometric literature review to find the trends of research on the discussion of Ethnoscience in science learning. The descriptive method with the bibliometric approach was applied in this research. The articles were found on the Google Scholar and Scopus databases assisted by the Publish or Perish (PoP) software. The numbers of articles obtained were 661 in 2015-2020 (5 year period). All articles had been selected according to the criteria determined by the researcher. The Mendeley software was used to manage the metadata so that the final numbers of articles were 272. The visualization was produced using Bibliometric VOSviewer software. The trends recommendations for further research on the Ethnoscience in science learning are related to ethnostem, chemistry learning, and the development of teaching material in the form of books and worksheets related to Ethnoscience in science learning.

1. Introduction
Rapid globalization is one of the reasons for diminishing local cultural values in Indonesia. This is one of the reasons for shifting cultural values and local wisdom [1]. One of the efforts to create an environment for learning and exploring in learning is integrating culture as part of society [2]. An awareness of rediscovering the values of local wisdom and integrating it into the educational process is important. The current recommended education in Indonesia is Ethnoscience [3].

Ethnoscience-based learning needs to be adapted to the conditions of students in the surrounding area [4]. Learning science is part of an effort to prepare students to think responsibly, critically, and creatively in response to problems in the community [5]. The students’ ability to integrate learning into everyday life is still weak [6]. Teachers must be able to insert local cultural values in the science and non-science learning process [7]. To increase the relevance of science education, science teaching requires the curriculum and pedagogy to go beyond the theory and facts [8]. Ethnoscience is one of the activities that transform original science into scientific science [9]. This culture-based learning has various benefits in increasing quality. Ethnoscience will make it easier for students to explore facts and phenomena that exist in society and can be integrated with scientific knowledge [10,11].

Research on Ethnoscience has been carried out at the elementary, intermediate, to tertiary levels. However, the results of this research only reveal changes in the relationship between the concept of science and local culture, achievement, science process skills, appreciation, and local cultural perceptions [12]. From the results of research that has been done previously, Ethnoscience-based teaching materials can improve students’ learning outcomes [13,14]. Learning using integrated science materials of fish smoking through Ethnoscience is successful in improving students’ scientific literacy [15], increasing student achievement, and encouraging critical thinking skills [16]. Ethnic-based
learning can improve science process skills and students' appreciation of local cultural development [17]. Ethnoscience learning opportunities provide space for the world of education to assist local governments in optimizing regional potentials related to Ethnoscience potential [18].

One way that can be used to improve students' abilities is to integrate Ethnoscience or local wisdom into learning materials [19]. Science will be easy when it makes sense and relates to the environment, human interests, and aspirations [20]. Ethnoscience-based learning provides better knowledge of science process skills for students [21]. Ethnoscience integrated science learning is based on a constructivist view that prioritizes the creation of meaning. Education and culture today are two complementary things [22].

Ethnoscience was chosen because Indonesia is a country that is rich in various national cultures and hereditary cultures [23]. Local wisdom from the community as a culture can be maintained. It is necessary to preserve the local culture or Ethnoscience [24]. Based on various previous research, ethnoscience research is an attempt to integrate culture into existing science learning. However, the review that discusses the bibliometric literature review has not been discussed. The purpose of this research is to provide a bibliometric literature review to find recommendations for opportunities for future trends to research Ethnoscience in science learning.

2. Research Method

The research method used was descriptive research with the bibliometric approach. The bibliometric analysis aims to measure the development of scientific article publications and scientific contributions [25,26]. Bibliometrics has systematic and explicit methods [25, 26]. This method consists of five stages [25,27]. It aims to determine the pattern and frequency of published article citations [30]. Bibliometric reviews are generally used in scientific disciplines and focused on the quantitative research of journals, papers, books, or other types of written communication [27]. The Publish or Perish (PoP) software employed in this research is a software program that can retrieve and provide academic citations. It can list results from metadata of Google Scholar [31].

Article metadata had been obtained from search results based on criteria that match the focus of the research. It was based on 2015-2020 only with the keywords used was limited to ’ethnoscience in learning on journals. The selection was based on the suitability of titles, keywords, and abstracts that had been analyzed manually. Furthermore, all the metadata that had been selected was entered into the Mendeley software for the abstract adjustment selection stage. The visualization output was displayed by the VOSviewer software. The VOSviewer software can classify keywords into different clusters. [27]. It can display maps in several ways, each emphasizing a different aspect of the map [32].

The following are five stages of bibliometric analysis:
2.1. Determining Search Keywords
A metadata search was conducted in August 2020 with the keywords of Ethnoscience in learning. Metadata collection was carried out in the Google Scholar and Scopus databases using Publish or Perish (PoP) software. The first search was done by inputting the keywords 'Ethnoscience in learning' into Publish or Perish (PoP).

2.2 Initial Search Results
The article's metadata period was 2015-2020. The keywords had been limited to 'Ethnoscience in learning' by journal only. There were 635 articles sourced from the Google Scholar database and 26 articles from the Scopus database. All metadata obtained were stored in the RIS format (Research Information System). It was able to completely store the data obtained from these two sources.

2.3 Refinement of Search results
All articles submitted were manually filtered by the researchers, apart from journals, so they were not included in the search criteria. The metadata from the Google Scholar database had been obtained beforehand resulted in 253 articles to be displayed in the analysis. From 26 articles obtained in the Scopus database, 19 were relevant to the analysis criteria. The criteria for selecting the articles were the keywords 'Ethnoscience in learning' and the suitability of the abstract and the title. All selected articles were saved in RIS format for further analysis using Mendeley software.

2.4 Compilation of Preliminary Statistical Data
The selected articles were imported into Mendeley based on the display specifications, namely title, researcher, year, keywords, abstract, and sources link journal.

2.5 Data Analysis
All metadata outputs that have been selected and analyzed were then displayed by VOSviewer which provided three map visualizations, namely network visualization, overlay visualization, and density visualization. The map visualization had been explored in detail [25]. The researchers were assisted by the VOSviewer with complete mapping visualization features. VOSviewer can work efficiently with a large number of data sets and provide a variety of visually attractive and clear analyzes [26].

Figure 1. Five Bibliometric Analysis Stages
Google Scholar was considered an alternative that provided scientific literature extensively in scientific disciplines and sources [31]. Scopus is the largest data center in the world that includes tens of millions of scientific literature published since decades ago. It is owned by Elsevier. It has accurate metadata for each scientific article, including publication data, abstracts, and other references. It helps the researchers to search, analyze, and visualize research more effectively [25]. In this research, the researchers focused on international journal publications (Scopus) and Google Scholar.

3. Result and Discussion

Based on metadata search results on Publish Or Perish (PoP) with the keyword 'ethnoscience in learning', 635 articles were obtained from the Google Scholar database in the last five years (2015-2020) and 26 articles were obtained from the Scopus database. All articles obtained from the metadata were selected according to the focus of the research. The results output from the Publish Or Perish (PoP) software had been visualized by the Vosviewer by determining the keywords. The Vosviewer software helps in displaying visualizations on the database in three different types namely, network visualization overlay visualization, and visualization density.

By filtering the metadata, a total of 272 articles in the last five year period were analyzed. There were 208.80 citations/year in the Google Scholar database and 96.7 citations/year in the Scopus database. Based on the results of metadata search on PoP sourced from Google Scholar, 635 articles were found with the following specifications:

3.1 The Metadata of Publications.

| Data Metrics for Search Results | Keywords | 'Ethnoscience in Learning' |
|--------------------------------|----------|---------------------------|
| Publication Year Documents     | 2015-2020| 635                       |
| Quotations                     | 1044     |
| Citing / year                  | 208.80   |
| Citing/paper                   | 1.64     |
| Researcher / paper             | / 2.08   |
| H_Index                        | 13       |
| g_index                        | 21       |
| hI_norm                        | 11       |
| hI_annual                      | 2.20     |

| Data Metrics | Search Results for Key | 'Ethnoscience in Learning' |
|--------------|-------------------------|---------------------------|
| Publication Year Documents | 2015-2020 | 26                         |
| Quotations   | 29                      |
| Quoting / year | 9.67       |
| Quoting / paper | 1.12      |
| Researcher / paper | / 1.00   |
| H_Index      | 3                       |
| g_index      | 4                       |
All article metadata obtained were analyzed selectively by searching the keywords limited to 'Ethnoscience in learning'. From 661 articles obtained in the initial search, only 272 articles on the final selection results that matched the focus of this research. The VOSviewer software helped in visualizing the metadata mapping. The visualization of the Google Scholar database is shown in the following figure:

![Network Visualization of the Google Scholar Database](image)

**Figure 2.** Network Visualization of the Google Scholar Database (GS)

The displayed mapping is the result of a collection of journal citation metadata that had been obtained [32]. The visualization displays 253 articles that match the criteria, namely keywords, titles, and calculated abstracts. Each term represents a keyword and title, and abstract related to the research. Based on the input data, 1 writer has 5 documents resulting in 1455 terms where 59 terms were relevant to the criteria. After the first results had been obtained, the next input was determined to have 3 minimum occurrences term which resulted in 35 corresponding titles. Each term that represents keywords and researchers had been adjusted to a complete abstract. There are three different clusters of network visualization as shown in figure 2.

The first cluster (yellow) had 7 terms, namely five occurrences of Papua, four occurrences of research, three occurrences of achievement, five occurrences of technology, six occurrences of reconstructions, sixteen occurrences of experience, and five occurrences of evaluation. The second cluster (green) had 6 terms of maximum occurrence, namely twenty-two times co-occurrences of primary schools, three co-occurrences of developing student worksheets, eighteen co-occurrences of senior high schools, ten co-occurrences of science, five co-occurrences off junior high school (5), five co-occurrences of environment, five co-occurrences of material, three times co-occurrences of primary schools, and eight co-occurrences of state senior high school. The light green color in the 2018 area approaching 2019. Lastly, there were three co-occurrences of book development and three co-occurrences of the student worksheet.

In the last cluster, there were 8 terms of relevance occurrence, namely three co-occurrences of chemistry, seven co-occurrences of physics, seven co-occurrences of the effects of models, seven co-occurrences of society, five co-occurrences of the effects of new models, and five co-occurrences of improvement based on a maximum of twenty-three co-occurrences. The keywords in each cluster represented the deep research entitled 'Ethnoscience in learning' carried out in the last five year period. The clusters consisted of 3 color clusters represented the selected terms.
The visualization output of data mapping had been provided based on five minimum occurrences which resulted in 43,888 with 68 selected terms. There were five clusters based on the title and abstract (see Figure 3). The first cluster is yellow for science (16), technology (5), and project (12). The second cluster is light green for character education (23), character (11), and physics (40). The third cluster is green for problem-based learning (9), physics (7), and student worksheet (6). The fourth cluster is light blue for material (20), media (19), and PbJL (6). The last cluster is dark blue for Ethnoscience research in the community (7) and school (28).

Each color represents the year available from 2017-2019. The yellow color shows the research that has just been carried out in 2019 while the dark blue is research that has been carried out several years ago. It can be identified that each cluster connects by title and abstract. Based on the bibliometric analysis depicted by VOSviewer, the trend of research that has not been carried out and has the opportunity to be carried out is the keyword ‘the development of worksheets’ with a transparent cluster. The visualization is the title and abstract contribution of 'Ethnoscience in learning'. The color explains the researchers’ contribution to scientific work. The dominant dark color clusters represent the recently done research and have been done a lot while the transparent colors and less bright colors represent the gaps in conducting research.

Emerging trends and critical changes of the clusters can also be detected that allows researchers to identify research gaps and research boundaries where they can contribute to subsequent areas of research [26]. Based on the results of the visualization produced in the Google Scholar database, there are gaps or opportunities for research related to ethnoscience in learning, namely in the field of development (books and worksheets). In this case, the literature review is qualitative and based on personal judgment [26] so that based on the results of the visualization, there is a gap that serves as the recommendation in the field of product development of teaching materials (books and worksheets).
The output shows that there are five clusters of color in two years period. The minimum determining occurrences of the term was 2 resulting in 102 terms with 6 selected terms. The ethnosience occurrences 11 times represented by light green, ethnoSTEM occurred 2 times, STEM occurred 3 times, scientific literacy occurred 3 times, and chemistry learning occurred 2 times. Based on the results of the terms shown, the highest occurrences were ethnosience (11 times) and the lowest occurrences were ethnostem (2 times). Ethnostem is recommended in further research because it has not been done much.

The results of the researcher density visualization with the keyword 'Ethnosience in learning' are Sudarmin (see Figure 4). The yellow color shows 19 researchers. So that in the visualized Scopus
database (see Figure 5), it can be said that the dominant researcher density was Sudarmi with 20 articles analyzed. The opportunity for further research in the Scopus database is related to the the-STEM.

4. Conclusion
Based on the results of the analysis, the recommended future research trends in the Scopus database are ethnostem and chemistry learning. The recommended future research trends in the Google Scholar database are book and worksheets development. All articles were collected using Publish Or Perish (PoP) software. The detailed selection of metadata had been obtained manually and adjusted with the help of Mendeley. The output results were visualization mapping displayed by VOSviewer.

Reference
[1] Puspasari A, Susilowati I, Kurniawati L, Utami R R, Gunawan I dan Sayekti I C 2019 Implementasi Etnosains dalam Pembelajaran IPA di SD Muhammadiyah Alam Surya Mentari Surakarta Sci. Educ. J. 3 25–31
[2] Nadhifatuzzahro D dan Suliyah 2019 Kelayakan Lembar Kegiatan Siswa (LKS) Berbasis Etnosains pada Tema Jamu untuk Melatihkan Literasi Sains Siswa J. Pendidik. Sains 7 225–34
[3] Kurniawan R dan S S 2020 Analisis media dalam pengembangan inkuiri panduan berbasis e-modul terintegrasi dengan ilmu etnosains dalam pembelajaran fisika di SMA Analisis media dalam pengembangan inkuiri panduan berbasis e-modul terintegrasi dengan ilmu etnosains dalam pembelajaran J. Fis. Conf. Seri
[4] Sapitri R D, Hadisaputra S dan Junaidi E 2020 Pengaruh penerapan praktikum berbasis kearifan lokal terhadap keterampilan literasi sains dan hasil belajar J. Pijar Mipa
[5] Zidny R 2020 Refleksi Multi Perspektif tentang Bagaimana Pengetahuan Pribumi dan Ide Terkait Dapat Meningkatkan Pendidikan Sains untuk Keberlanjutan J. Pendidik. SAiNS
[6] Hadi W P, Hidayati Y dan Rosidi I 2020 Respon Guru Ipa Terhadap Pembelajaran Ipa Berintegrasi Etnosains : Studi Pendahuluan Di Kabupaten Bangkalan J. Fis. 10 46–53
[7] Rahmatiah A N, Maulyda M A Dan Syazali M 2020 Refleksi Nilai Kearifan Lokal (Local Wisdom) Dalam Pembelajaran Sains Sekolah Dasar: Literature Review J. Pendidik. Sains 7 151–6
[8] Zidny R dan Sjöström J I E 2020 Refleksi Multi-Perspektif tentang Bagaimana Pengetahuan Adat dan Gagasan Terkait Dapat Meningkatkan Pendidikan Sains untuk Keberlanjutan J. Pendidik. Sains
[9] Ahmadi Y, Astutii B dan Linuwih S 2019 Bahan Ajar IPA Berbasis Etnosains Tema Pemanasan Global untuk Peserta Didik SMP Kelas VII Unnes Phys. Educ. Journa 8
[10] Melyasari N, Suyatno S dan Widodo W 2019 Validitas Bahan Ajaran Berbasis Etosence Batik untuk Meningkatkan Kemampuan Literasi Ilmiah untuk Sekolah Menengah Pertama. J. Fis. Seri Konf. 1–8
[11] Arfianawati S 2016 Model Pembelajaran Kimia Berbasis Etnosains Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa 46–51
[12] Permatasari F, Madlazim Dan Widodo W 2019 Pengembangan Perangkat Pembelajaran Dengan Model Inkuiri Terbimbing Berbantuan Etroid (Etnosains Android) Pada Materi Getaran Dan Gelombang J. Pembelajaran Sains 3 70–4
[13] Ahmadi Y, Astuti B dan Linuwih S 2019 Bahan Ajar IPA Berbasis Etnosains Tema Pemanasan Global untuk Peserta Didik SMP Kelas VII Unnes Phys. Educ. Journa 8
[14] Fitriah L 2019 Efektivitas Buku Ajar Fisika Dasar 1 Berintegrasi Imtak dan Kearifan Lokal Melalui Model Pengajaran Langsung Berk. Ilm. Pendidik. Fis. 7
[15] Sarini P dan Selamet K 2019 Pengembangan Bahan Ajar Etnosains Bali bagi Calon Guru IPA J. Mat. dan Pembelajaranannya 13 27–39
[16] Permatasari F, Madlazim M dan ... 2019 Pengembangan Perangkat Pembelajaran dengan Model Inkuiri Terbimbing Berbantuan Etroid (Etnosains Android) pada Materi Getaran dan Gelombang J. Pembelajaran...
[17] Atmojo S E, Kurniawati W dan Muhtarom T 2020 Pembelajaran Ilmu Pengetahuan Terpadu Etnoscience untuk Meningkatkan Literasi Ilmiah dan Karakter Ilmiah J. Fis. Seri Konf.

[18] Andayani Y, Purwoko A A, Jamaluddin J dan ... 2020 Identifikasi Pemahaman Guru Tentang Pengembangan Perangkat Pembelajaran IPA SMP dengan Pendekatan Etnosains J. ...

[19] Khery Y Dan Erna M 2019 Studi Etnoscience Dalam Pembelajaran Kimia Untuk Mengembangkan Literasi Ilmiah J. Pendidik. Ipa Indones. 8 279–87

[20] Shofiyah N 2020 Pengaruh Penerapan Modul Dinamika Partikel Terintegrasi Permainan Tradisional Terhadap Persepsi Mahasiswa Tentang Ipa Pros. Semin. Nas. Rekarta 2020

[21] Hayati N dan Ridho S 2020 Analisis Validitas Isi Lembar Kerja Wawancara Berbasis Etnosains di Bukit Ajimut untuk Pembelajaran Farmakognosi Tanaman Obat Analisis Validitas Isi Lembar Kerja Wawancara Berbasis Etnosains di Bukit Ajimut untuk Pembelajaran Farmakognosi Tanaman Obat

[22] Atmojo S E, Kurniawati W dan Muhtarom T 2020 Pembelajaran Sains Etnosains Terpadu untuk Meningkatkan Literasi Ilmiah dan Karakter Pembelajaran Sains Etnosains Terpadu untuk Meningkatkan Literasi Ilmiah dan Karakter Ilmiah

[23] Sudarmin, Sumarnii W, Mursiti S dan Sumarti S 2020 Profil keterampilan berpikir inovatif dan kreatif mahasiswa dalam mendesain batik kimia setelah mengalami pembelajaran ethnoscience integrated science technology engineering mathematic integrated ethnoscience ( ethno-stem ) J. Fis. Seri Konf.

[24] Sudarmin, Febu R, Nuswowati M dan Sumarni W 2017 Pengembangan Pendekatan Etnosains pada Materi Aditif untuk Meningkatkan Hasil Meningkatkan Hasil Belajar Kognitif dan kewirausahaan siswa J. Fis. Seri Konf.

[25] Hakim L 2020 Analisis Bibliometrik Penelitian Inkubator Bisnis Pada Publikasi Ilmiah Terindeks Scopus J. Ilm. Manaj. E-Issn 8 176–89

[26] Liu Z, Yin Y, Liu W dan Dunford M 2015 Memvisualisasikan struktur intelektual dan evolusi penelitian sistem inovasi: analisis bibliometri Scientometrics

[27] Setyaningsih I, Indarti N dan Jie F 2018 Bibliometric analysis of the term “green manufacturing” Int. J. Manag. Concepts Philos. 11 315

[28] Garza-Reyes J A 2015 Lean and green-a systematic review of the state of the art literature J. Clean. Prod. 102 18–29

[29] Tranfield D, Denyer D dan Smart P 2003 Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review Br. J. Manag. 3 207–22

[30] Parmar A, Ganesh R dan Mishra A K 2019 100 artikel teratas yang dikutip di Obsessive Compulsive Disorder (OCD): A citation analysis J. Psikiatri Asia 42 34–41

[31] Baneyx A 2008 Publish atau Perish“ sebagai metrik kutipan yang digunakan untuk menganalisis keluaran ilmiah dalam humaniora: studi kasus Internasional di bidang ekonomi, geografi, ilmu sosial, filsafat, dan sejarah 363–71

[32] Eck N J van dan Waltman L 2010 Survei perangkat lunak: VOSviewer, program komputer untuk pementa bibliometri Scientometrics 84 523–38