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## **The Trend Ethnopedagogy Research as Contribution in Elementary Science Learning in The Era of Industrial Revolution 4.0**

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**Abstract:** Ethnopedagogy is an approach to education that uses students' culture and cultural context as a basis for the learning process. Ethopedagogy is important because it helps shape individuals who are not only academically intelligent but also have a strong moral and ethical awareness, which is very necessary to face the complex challenges in today's global society. This research aims to identify and analyze ethnopedagogical research trends in their contribution to elementary school science learning in the era of revolution 4.0. This research method is descriptive and analytical. The data used in this research was obtained from documents indexed by Google Scholar from 2015-2024 using Publish or Perish and Dimension.ai. Research procedures use PRISMA guidelines. The data identified and analyzed included types of publications, authors on ethnopedagogy, sources of publications, and titles of research on ethnopedagogy that were widely cited. The data analysis method uses bibliometric analysis assisted by VOSviewer software. The results of the analysis show that the trend of ethnopedagogical research indexed by Google Scholar from 2015 to 2024 has experienced a fluctuating increase. The biggest increase was from 2020 to 2021, then decreased in 2022. There are many documents in the form of articles, proceedings, or edited books that discuss ethnopedagogy research. Key words that are often used in ethnopedagogical research are culture, local wisdom, local wisdom, ethnopedaogical values, and learning process.

**Keywords:** elementary science learning; ethnopedagogy; industrial revolution 4.0

### **INTRODUCTION**

The Industrial Revolution 4.0 emerged marked by new breakthroughs in the field of technology covering broad fields such as artificial intelligence (AI), internet of things (Internet of Things-IoT), automated vehicles, 3-dimensional (3D) printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing (Saddler, 2020; Sherwani et al., 2020). The Industrial Revolution 4.0 will create new technologies that are sophisticated and can help the work within the company. With the creation of this new technology, it will help human resources in dealing with various types of work, and more quickly in carrying out tasks, with new breakthroughs and new sophistication in technology, there will be many new things that must be learned to be able to apply them to the daily lives of human resources (Zambon et al., 2019).

Revolution 4.0 emphasizes the importance of 21st century skills such as creativity, critical thinking, and communication (Shahroom & Hussin,

2018). Integration of physical devices connected to the internet allows teachers and students to communicate and share data (Lase, 2019). The industrial revolution 4.0 brought significant changes in various aspects of life, including education, such as science learning in elementary schools. Science learning in elementary school has the aim of equipping students with a basic understanding of various natural and scientific phenomena (Hussein et al., 2019; Leasa et al., 2020). Science learning can be a forum for developing students' digital skills. Revolution 4.0 emphasizes the importance of digital skills in facing future challenges. Science learning also pays attention to the development of scientific attitudes, such as honesty, cooperation, thoroughness, and the courage to try new things.

Science learning in the Industry 4.0 era can focus more on project-based learning (Krajcik & Czerniak, 2018). Students can work on scientific projects that involve

research, experimentation, and developing solutions to real problems. Science learning in the Industry 4.0 era emphasizes the importance of lifelong learning. Students need to have the ability to continue learning and adapt to developments in science and technology. Students need to get used to linking science learning with real contexts in students' lives (Candra et al., 2020). One of them is the use of ethnopedagogical approach in IPA learning.

Ethnopedagogy is an approach or concept in education that integrates cultural elements and community traditions in the learning process (Selasih & Sudarsana, 2018; Sandor, 2019). This approach recognizes that each cultural group has unique ways of understanding and transmitting knowledge. Ethnopedagogy emphasizes the importance of respecting cultural diversity and integrating local values and practices into formal educational contexts. Ethnopedagogy emphasizes respect for the uniqueness of each individual and group (Sayfiddinovich, 2022). Each student is considered an individual who brings different cultural backgrounds and experiences. The ethnopedagogical approach aims to create an inclusive, deep and meaningful learning environment for students, while still paying attention to and respecting existing cultural diversity. This approach can be applied at various levels of education and adapted to specific cultural contexts (Ardiawan, 2018).

In the context of science learning, ethnopedagogy can help students understand the importance of environmental sustainability and sustainable practices in their society. Ethnopedagogy encourages students to actively explore their environment (Kasih et al., 2019). This can involve field trips to nearby natural places, nature observations, and simple experiments relevant to the science topic. Ethnopedagogy recognizes that students bring knowledge and experiences from their own culture. In science learning, this means respecting the traditional or local knowledge that students have about their natural environment, plants, animals and other natural phenomena. Teachers can start learning by listening to stories, myths or traditional knowledge that students have about nature (Hidayah et al., 2023; Neustroev et al., 2018).

By applying the principles of ethnopedagogy in elementary science learning, teachers can help students develop a deeper understanding of natural science while respecting and utilizing local knowledge and their own culture. This can make learning more relevant, interesting and meaningful

for students. Therefore, this research wants to know the trend of ethnopedagogical research as a form of contribution in the era of revolution 4.0. It is hoped that this research can become a reference in developing further research related to the development of ethnopedagogy-based learning tools in elementary school science learning.

## **METHODS**

This research method is descriptive and analytical, which aims to understand and describe ethnopedagogical research trends in the context of elementary school science learning in the era of revolution 4.0. Apart from that, this method also provides insight into the development and evolution of ethnopedagogical-based educational practices in science learning in elementary schools. The data used in this study was obtained from information sources indexed by Google Scholar using analytical tools such as Publish or Perish and Dimension.ai. To carry out a search on Google Scholar, keywords related to ethnopedagogical research trends in the context of science learning in the era of the Industrial Revolution 4.0 are used.

In this research, an analysis was carried out on 1,000 documents that had been indexed by Google Scholar between 2012 and 2022. The reason for choosing Google Scholar as a document search source is because Google Scholar applies consistent standards in selecting documents to be included in its index and also because Google Scholar has more documents than any other major database, especially in the context of research in education and social sciences. To filter data that has been collected via Publish or Perish, researchers used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

## **FINDINGS AND DISCUSSION**

This research aims to analyze research trends on ethnopedagogy in contributing to elementary science learning in the era of revolution 4.0. The research document on research trends regarding ethnopedagogy in contributing to elementary school science learning in the 4.0 revolution era is taken from documents from 2015 to 2024. Figure 1 is

presented below regarding ethnopedagogical research trends in contributing to elementary school science learning in the 4.0 revolution era.

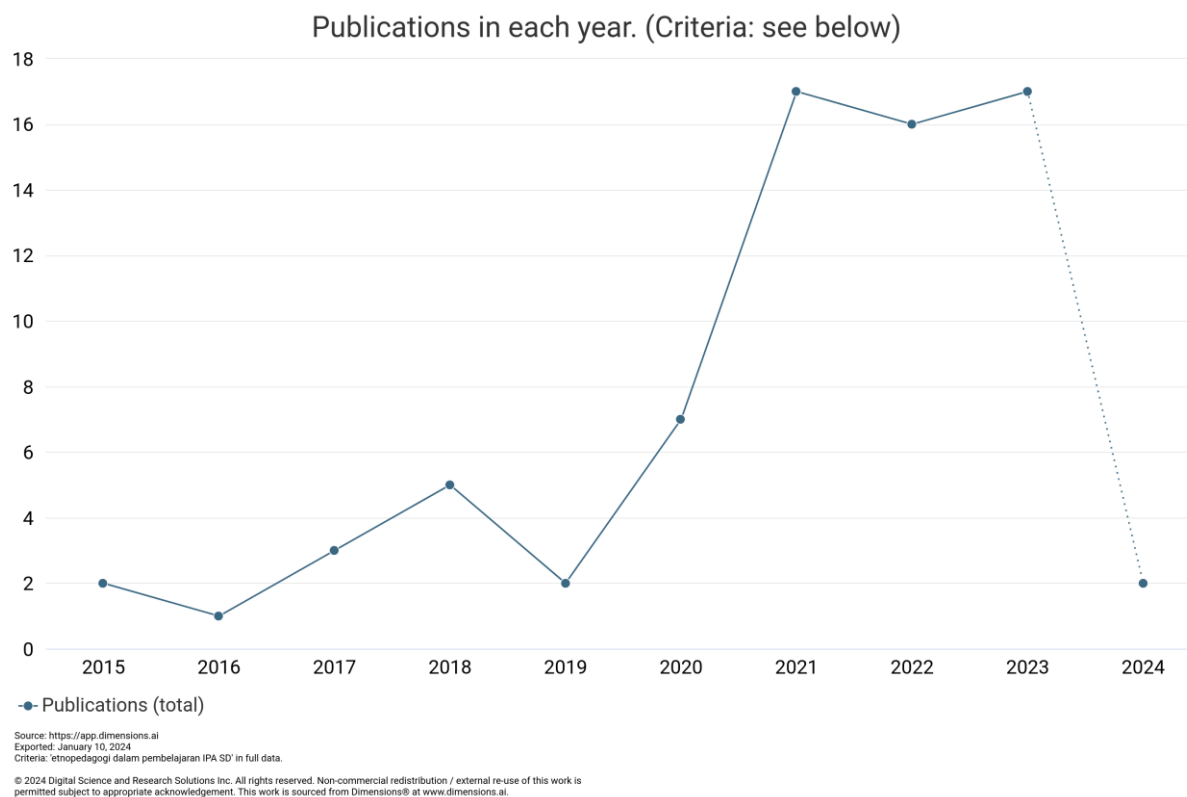


Figure 1. Trend Ethnopedagogy Research in Science Learning

Figure 1 above shows that the trend of ethnopedagogical research from 2015 to 2024 has increased. Where the research trend is with an increase in the number of publications every year, namely from 2020 to 2021. However, in 2022 the trend for ethnopedagogical research decreased, then increased again in 2023. The increase in the trend for ethnopedagogical research is due to the ethnopedagogical approach prioritizing collaborative learning in which teachers, students and the community play an active role in the learning process. Teachers and students can learn together, and local communities can make valuable contributions.

2020 to 2021 are very special years in the world of education because of the COVID-19 pandemic which has affected learning demands throughout the world ((Pokhrel, S., & Chhetri, 2020). 2020 taught us the importance of flexibility and creativity in education. Teachers adapt to challenges and find new ways to teach. One way is by applying learning based on contextual or ethnopedagogy. Below we also present trends in

ethnopedagogical research based on the type of publication.

Table 1. Trend Ethnopedagogy Research Based on Publication Types

Publication Type	Publications
Article	59
Proceeding	4
Edited Book	9

Based on Table 1, it is known that ethnopedagogical research from 2015 to 2024 is contained in 3 types of publications. In the form of articles as many as 59 documents, proceedings as many as 4 documents, and edited books as many as 9 documents. The trend of ethnopedagogical research in the form of articles is the type of publication that contains the most research on ethnopedagogy compared to other types of publications. Meanwhile, the type of publication that contains the least amount of ethnopedagogical

research results is proceedings. Research conducted by Singh et al (2021) states that articles area form of scientific publication that is generally short and focuses on a particular topic or aspect in a field of science or research. These articles are usually

published in scientific journals both in print and online. Below are also presented the 10 top researchers who conduct research on ethnopedagogy.

Table 2. Top 10 Researchers on Trend Ethnopedagogy Research in 2015-2024

Author	Organization	Publications	Citations	Citations Mean
Congratulations	Yogyakarta State University	2	9	4.50
Zaka Hadikusuma Ramadan	Islamic University of Riau	2	0	-
Maria Waldetrudis Lidi	Flores University	2	2	1.00
Maimunah Haji Daud	Flores University	2	2	1.00
Kartika Rinakit Adhe	State University of Surabaya	1	1	1.00
Ardian Asyhari	Raden Intan Lampung State Islamic University	1	1	1.00
Avikasari Avikasari	Eleven March University	1	0	-
Encep Syarifudin	Sultan Maulana Hasanuddin State Islamic University	1	0	-
Street Street	Tanjungpura University	1	0	-
Nurlaili - Nurlaili	Shia Kuala University	1	0	-

Table 2 shows the top ten (10) researchers who conduct research on ethnopedagogy. As has been explained that Ethnopedagogy is an educational approach that refers to the use of students' culture and cultural context as a basis for the learning process (Rahmawati et al., 2021). This approach tries to understand, respect and integrate student culture into the educational process so that learning becomes more relevant and effective (Hariyadi et al., 2019).

Table 2 above shows that Congratulations which derive from Yogyakarta State University has 2 publications on ethnopedagogy with an average citation of 4.50. One of the titles of his research on ethnopedagogy is "Development of SSP for substances and energy based on local excellence to increase scientific literacy and environmental awareness." The results of his research show that integrated science learning tools based on local wisdom are suitable for

increasing students' scientific literacy (Tyas et al., 2020).

Apart from Insih Wilujeng, Zaka Hadikusuma is also a writer/researcher on ethnopedagogy. He has written 2 articles with one of the research titles being ""Development of a Thematic Module Based on Ethnopedagogy on the Sub-theme of Independence Events for Class V Students of Sd Negeri 17 Pekanbaru". The results of the research show that the design expert's assessment is categorized as very valid with a percentage of 95.53%. Then the material expert's assessment of the module was categorized as very valid with a percentage of 90.00%. Furthermore, the linguist's assessment of the module was categorized as 95.31%. Overall, the validation results obtained from design experts, materials and language experts were an average of 93.61% with very valid criteria. Below are also presented the top ten (10) sources of ethnopedagogical research trends.

Table 3. Top 10 Sources Title Trend Ethnopedagogy Research in 2015-2024

Name	Publications	Citations	Citations Mean
<a href="#">Advances in Social Science, Education and Humanities Research</a>	11	3	0.27
<a href="#">Jurnal Ilmiah Pendidikan Profesi Guru</a>	3	3	1.00
<a href="#">Refleksi Edukatika</a>	3	0	-
<a href="#">JPI (Jurnal Pendidikan Indonesia)</a>	2	2	1.00
<a href="#">Journal of Educational Science and Technology (EST)</a>	2	7	3.50
<a href="#">Jurnal Ilmiah Profesi Pendidikan</a>	2	1	0.50
<a href="#">Terampil Jurnal Pendidikan dan Pembelajaran Dasar</a>	2	11	5.50
<a href="#">International Journal of Disaster Risk Reduction</a>	1	0	-
<a href="#">Jurnal Inovasi Pendidikan IPA</a>	1	8	8.00
<a href="#">Elementary School Journal PGSD FIP UNIMED</a>	1	0	-

Table 3 shows that the most widely published sources of ethnopedagogical research trends are: *Advances in Social Science, Education and Humanities Research*, namely 11 publications with 3 citations and an average citation of 0.27. The proceedings series *Advances in Social Science, Education and Humanities Research* aims to publish proceedings from conferences on the theories and methods in fields of social sciences, education and humanities. All proceedings in this series are open access, i.e. the

articles published in them are immediately and permanently free to read, download, copy & distribute. Each volume is published under the CC BY-NC 4.0 user license which defines the permitted 3rd-party reuse of its articles. The online publication of each proceedings is sponsored by the conference organizers and hence no additional publication fees are required. Below are also presented the five (5) top trends in ethnopedagogical research which are widely cited by other researchers related to this matter.

Table 4. Top 5 Citation on Trend Ethnopedagogy Research in 2015-2024

Cites/year	Year	Author	Title
16.50	2018	I Oktavianti, Y Ratnasari	Ethnopedagogy in learning in elementary school through media based on local wisdom
8	2017	P Putra	Ethnopedagogical approach in the learning of IPA SD/MI
6	2015	SM Leksono, A Syachruraji...	Development of conservation biology teaching materials based on ethnopedagogy
5.13	2016	F Understand	Science learning innovation based on ethnopedagogy
3.33	2021	M Muzakkir	Ethnopedagogy Approach as a Media for Preservation of Local Wisdom

Table 4 shows that ethnopedagogical research that is widely cited by other researchers is about "Ethnopedagogy in learning in elementary schools through local wisdom-based media" which is 16.50 (Oktavianti & Ratnasari, 2018). Then the research entitled "Ethnopedagogical approach in elementary/MI science learning" was cited 8 times (Putra, 2021). This data is comparable to data on the increasing

trend of ethnopedagogical research from 2015 to 2024. This means that in that year, research related to ethnopedagogy was continuously cited by other researchers.

In the articles researched and written by these researchers, there are many terms/keywords related to ethnopedagogy. Below are presented eleven (11) popular keywords related to ethnopedagogy.

Table 5. Keyword on Trend Ethnopedagogy Research in 2015-2024

<b>Terms</b>	<b>Occurences</b>	<b>Relevance</b>
Culture	3	2.91
Education	4	2.56
Ethnopedagogical studies	3	2.03
Learning process	4	1.48
Ethnopedagogy approach	4	1.41
Local wisdom	4	1.17
The value of ethnopedagogy	3	0.77
Elementary school	18	0.48
Culture	13	0.29
Local wisdom	18	0.23
ethnopedagogy	93	0.12

Table 5 shows that the keyword that frequently appears related to ethnopedagogical research is ethnopedagogy 93 times with a prevalence of 0.12. Ethnopedagogy is a concept that is increasingly gaining attention in research trends in the field of education. Ethnopedagogy assists research in understanding how students' culture influences learning.

Table 5 also shows that elementary school and local wisdom are also keywords that appear frequently in ethnopedagogical research trends, namely 18 times with a relevance of 0.48 and 0.23. The research theme of local wisdom and elementary schools is a very relevant topic in education. Local wisdom is a collection of knowledge, values, practices, traditions and understanding passed down from generation to generation within a particular community or

cultural group (Rummar, 2022). Local wisdom includes knowledge that has existed for a long time and developed in a particular cultural and environmental context.

Examining local wisdom in research is an important step to understanding, respecting and utilizing cultural and traditional knowledge in various contexts. Research on local wisdom can provide valuable insight into the richness of traditional culture and knowledge. This visualization is accomplished by generating a landscape map, which offers a visual representation of subjects related to scientific studies. The outcomes of bibliometric mapping for the co-word network in articles related to the topic of ethnopedagogy are illustrated in Figure 2.

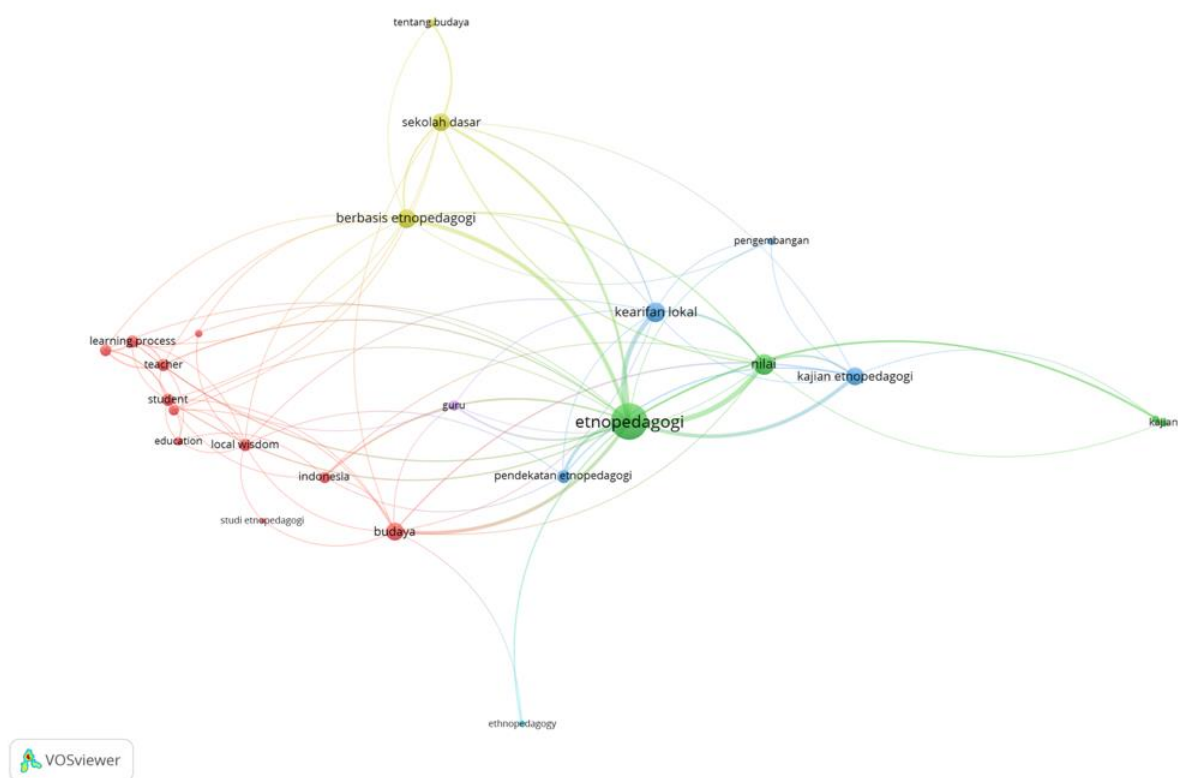


Figure 2. Network Visualization on Trend Ethnopedagogy Research

Figure 2 shows the results of bibliometric keyword mapping on ethnopedagogical research trends. In Figure 2 there are 24 keyword items that are often used in ethnopedagogical research from 2015 to 2024. The figure also contains 6 clusters, where the first cluster is colored red and consists of 11 keyword items, namely culture, education, ethnopedagogical approach, ethnopedagogy, Indonesia, learning, learning process, local wisdom, student, ethnopedagogical studies, and teacher. The second cluster in green consists of 4 keyword items, namely: ethnopedagogy, study, values, and ethnopedagogical values. The third cluster in blue consists of 4 keyword items, namely ethnopedagogical studies, local wisdom, ethnopedagogical approaches, and development. The fourth cluster in yellow consists of 3 keyword items, namely based on ethnopedagogy, elementary school, and about culture. The fifth purple cluster consists of 1 keyword item, namely

teacher. The sixth cluster in light blue consists of 1 keyword item, namely ethnopedagogy. The results of the circles network visualization analysis show the same thing as the results of the analysis carried out by (Suprpto et al., 2021), where there are six clusters in the trend analysis of other research as well.

Figure 2 above also shows that network visualization shows the network between the terms being visualized. Keywords classified into six clusters are arranged in a color chart showing the divisions/clusters that are connected to each other. The results of this analysis can be used to determine keyword research trends in the last year. This analysis shows several keywords that are often used in ethnopedagogical research. The more keywords that appear, the wider the visualization displayed. Below are also presented keywords about ethnopedagogy based on overlay visualization.





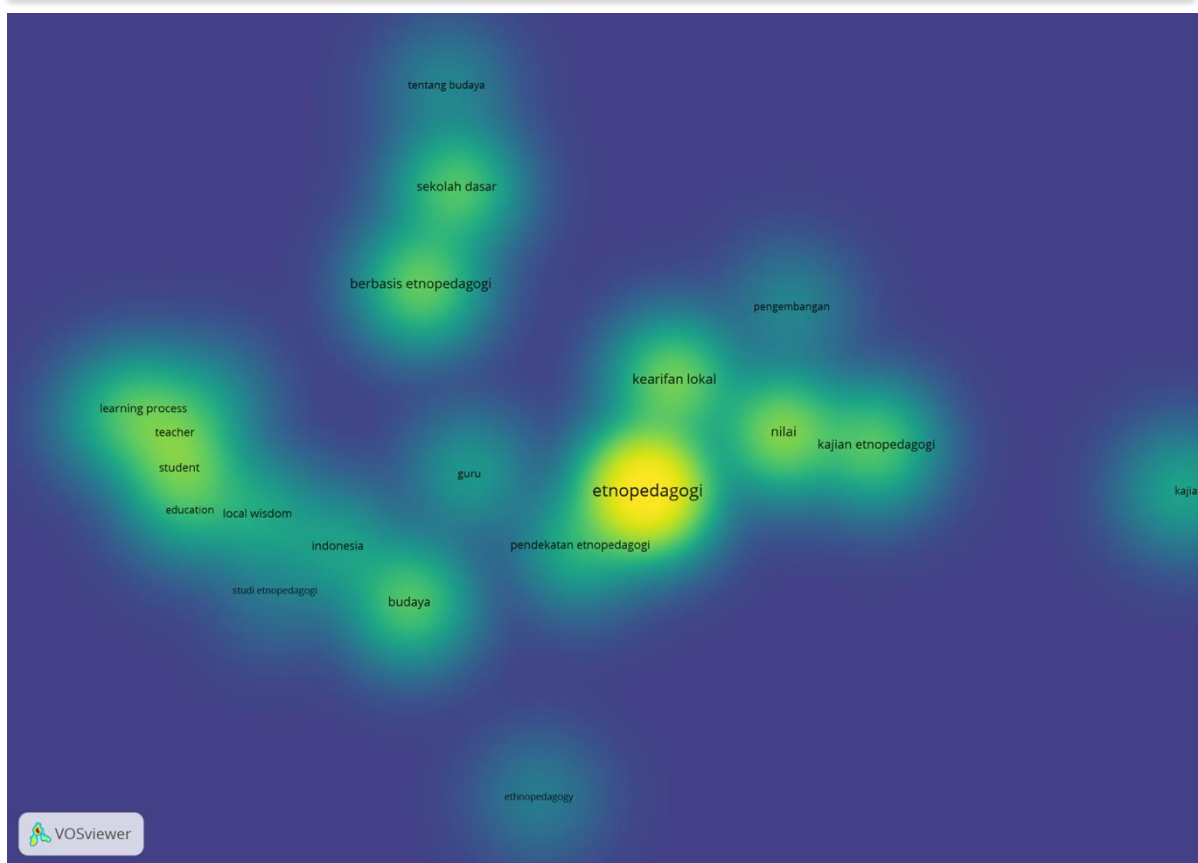


Figure 4. Density Visualization on Trend Ethnopedagogy Research

Figure 4 shows density visualization. The density of research themes is shown in bright yellow. The brighter the colors of a theme, the more research is done. The fainter the color means the theme is rarely researched. Dimly colored themes such as culture, ethnopedagogical development, and ethnopedagogical studies are dimly colored keywords. This shows that these keywords can be used as a reference for further research. Doyan et al., (2023) and Bahtiar et al., (2023) stated that yellow indicates keywords that are currently and frequently used in research.

Based on Figure 4 above, it is also known that. This ethnopedagogical research trend helps schools and teachers respond to the diversity of students' cultures and backgrounds. This can create a learning environment that is inclusive and supports all students. In addition, this research trend also opens the door for further research and the development of more effective learning strategies. This can encourage the development of better curricula and teaching methods. The development of ethnopedagogy in educational research helps understand how education can become more inclusive, relevant, and student-oriented (Aeni, 2019). This research trend reflects the importance of understanding

and appreciating cultural differences in modern education.

Research on ethnopedagogical trends in their contribution to elementary science learning has significant urgency in the context of educational development. Several reasons why research on ethnopedagogical trends in elementary school science learning is important are: 1) Ethnopedagogy allows respect for students' local knowledge and culture. Research in this area helps understand how local knowledge and traditions can be integrated into the science curriculum, so that students can feel more connected to their learning; and 2) Ethnopedagogical research helps ensure that science learning materials are presented in contexts that are relevant to students' daily lives. This can increase students' understanding and interest in science subjects.

Ethnopedagogy encourages the development of a deep understanding of nature and the environment around students. Research in this area can help identify effective ways to better teach science concepts. In the context of science learning, ethnopedagogical research can help students understand the importance of environmental sustainability and sustainable

practices in their communities. This contributes to more sustainable learning and awareness of environmental issues.

## CONCLUSION

Research on ethnopedagogical trends in their contribution to science learning in elementary schools has high urgency because it can improve the quality of education, especially in elementary science learning, increase student involvement, and create a more relevant and sustainable learning environment for students. The trend of ethnopedagogical research indexed by Google Scholar from 2015 to 2024 has experienced a fluctuating increase. The biggest increase was from 2020 to 2021, then decreased in 2022. There are many documents in the form of articles, proceedings, or edited books that discuss ethnopedagogy research. Key words that are often used in ethnopedagogical research are culture, local wisdom, local wisdom, ethnopedagogical values, and learning process.

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