Ethnoscience as the Policy Implementation of Kurikulum Merdeka in Science Learning: A Systematic Literature Review

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Abstract: The Kurikulum Merdeka policy has been implemented extensively in Indonesia since 2022, with one of its focuses being the integration of culture in teaching and learning. Several studies have been conducted on the integration of ethnosciences in science education. However, so far, there have been very few studies that attempt to review the results of the analysis of these articles. Therefore, this study aims to analyze a number of articles related to research on the topic of ethnosciences in science education as an implementation of the Kurikulum Merdeka policy, in order to classify them based on predetermined categories. This study utilizes the systematic literature review (SLR) method, which includes the stages of data search and article collection, article screening, assessment of the quality and suitability of scientific articles, and analysis and data classification. Based on these stages, six scientific articles were obtained, published in six SINTA-accredited journals with a focus on education and published between 2022 and 2023. The results of the quality assessment indicate that four out of the six articles meet the criteria for suitability. Thus, these articles can be considered as sources of information related to research on the topic of ethnosciences in science education as an implementation of the Kurikulum Merdeka policy. The classification has been conducted based on Indonesian culture integrated into science education, educational levels, subjects, and forms of integration of ethnosciences in science education.

Keywords: ethnoscience; Kurikulum Merdeka; science learning; systematic literature review

Introduction

Kurikulum Merdeka, or "Freedom Curriculum" in English, is an innovative educational framework implemented in Indonesia. Kurikulum Merdeka is a government policy as a strategic initiative undertaken by the Indonesian government to reform and enhance the education system in the country (Barlian et al., 2022; Suhandi & Robi'ah, 2022; Vhalery et al., 2022). The policy was introduced as part of a broader effort to provide students with a more relevant and comprehensive learning experience, aligned with the demands of the 21st century. It aims to provide students with a more holistic and student-centered learning experience, empowering them to become independent learners and critical thinkers (Vhalery et al., 2022). The Kurikulum

Merdeka deviates from the traditional rigid curriculum structure by prioritizing flexibility and individualization. It encourages students to actively engage in their own learning process, allowing them to explore their interests, talents, and passions (Wahyuni, 2022). The curriculum emphasizes the development of essential skills such as problem-solving, creativity, collaboration, and communication.

One of the key principles of the Kurikulum Merdeka is the integration of local wisdom and cultural values into the learning process (Hasibuan, 2023). It recognizes the importance of preserving and promoting Indonesia's diverse cultural heritage, ensuring that students develop a strong sense of national identity and appreciation for their local traditions. Furthermore, the Kurikulum Merdeka places significant emphasis on

character education and fostering positive values. It aims to nurture students' moral and ethical development, promoting empathy, tolerance, and respect for others.

One of the efforts to integrate culture with education is through the integration of ethnoscience with education, specifically in the process of learning (Sari et al., 2023; Wati et al., 2021). It recognizes the importance of cultural knowledge, beliefs, and practices in shaping individuals' understanding of the world. By incorporating ethnoscience into education, students are encouraged to explore and appreciate their own cultural heritage, as well as the cultural diversity around them (Pomeroy, 1994; Rahmawati et al., 2023; Rahmawati & Ridwan, 2017; Sumarni et al., 2020). Ethnoscience acknowledges that culture plays a significant role in how individuals perceive, interpret, and interact with their environment. The integration of ethnoscience with education emphasizes the integration of cultural perspectives and traditional knowledge systems into the learning process. By doing so, students gain a deeper understanding of the connections between their cultural backgrounds and the subject matter being taught (Branch, 2020; Gondwe & Longnecker, 2015; Howard & Terry Sr, 2011). By integrating culture into education through ethnoscience, students not only acquire knowledge and skills but also develop a sense of cultural empathy, respect, and understanding (Rahmawati & Ridwan, 2017). They learn to value different cultural perspectives and become more culturally competent individuals.

One of the school subjects that can integrate ethnoscience into its process is science learning. The integration of ethnoscience with science learning involves incorporating cultural perspectives, traditional knowledge, and practices into the study of science (Sari et al., 2023). It recognizes the importance of local cultural contexts and indigenous knowledge systems in understanding scientific concepts and phenomena (Dewi et al., 2019; Rist & Dahdouh-Guebas, 2006). By integrating ethnoscience into science education, students are exposed to diverse cultural perspectives on the natural world (Pomeroy, 1994). They learn about traditional ecological knowledge, indigenous scientific practices, and the ways in which different cultures observe and explain scientific phenomena. This integration allows students to develop a more holistic and culturally sensitive understanding of science. The integration of ethnoscience with science learning also promotes cultural pride and identity (Sari et al., 2023). Students learn about their own cultural heritage, as well as the cultural diversity of others, fostering respect and appreciation for different ways of knowing and understanding the world (Rahmawati & Ridwan, 2017).

This approach helps create a more inclusive and culturally responsive science education, particularly in the context of Indonesia's rich cultural diversity.

Several studies on the integration of ethnoscience in learning have been conducted by many researchers in Indonesia, and the research findings have been published in accredited national scientific journals as scholarly articles (Iskandar et al., 2022; Nurhasnah et al., 2022; Primadianningsih et al., 2023; Syazali & Umar, 2022; Wati et al., 2021). However, the abundance of documents related to these studies necessitates the need for narrowing down the focus to science learning, particularly in the implementation of the Kurikulum Merdeka policy, and specific aspects, in order to conduct analysis and classification of these articles. Therefore, this research aims to classify studies that have the topic of ethnoscience in science learning, so that they can be used as references and sources of information on this topic in Indonesia.

Method

The method used in this research is Systematic Literature Review (SLR) (Xiao & Watson, 2019). The SLR method in this research is used to search and synthesize scientific articles on a specific topic through the assessment of the quality of those articles (Lame, 2019). The stages conducted in this research process (Fitriani & Prahmana, 2021; Santosa & Hasibuan, 2022) are as follows: 1) data search and article collection; 2) articles screening; 3) assessment of the quality and suitability of scientific articles; and 4) analysis and data classification.

Data Search and Article Collection

The first stage of this research involves data collection using the assistance of a data search engine, namely Google Scholar. The search technique involves entering the keywords "ethnoscience Kurikulum Merdeka" with a publication year range of 2022-2023. The selection of this publication year range is due to the fact that the Kurikulum Merdeka policy has been widely implemented in Indonesia since 2022. Therefore, it is expected that the articles obtained will focus on the implementation of the Kurikulum Merdeka policy. Next, the article documents are downloaded from each scientific journal that published those articles. Data searches on Google Scholar and document article downloading from journals were conducted on June 30, 2023.

Articles Screening

The second stage of this research involves screening the articles obtained in the first stage. Limitations are applied to narrow down the search results to focus on

the topic of ethnoscience research in science learning in Indonesia. The first limitation is related to the subject aspect, specifically for research focused on science learning or within the field of science, such as Biology, Chemistry, and Physics. Furthermore, the second limitation is related to the country where the research was conducted. The limitation is applied only to articles that present research conducted in Indonesia. Next, the third limitation is related to the document type, specifically excluding article reviews and conference proceedings. The fourth limitation is related to the journals that publish scientific articles, specifically limited to journals accredited from SINTA 1 to SINTA 5.

Assessment of the Quality and Suitability of Articles

The third stage of this research is to assess the quality in order to determine the suitability of scientific articles as research information sources related to the topic of ethnoscience in science learning as the implementation of the Kurikulum Merdeka policy in Indonesia. The quality assessment is based on the following questions: 1) Is the term "*etnosains* (ethnoscience)" mentioned in the article? (Q1). 2) Is the term "Kurikulum Merdeka" mentioned in the article? (Q2). 3) Does the research objective stated in the article relate to the integration of ethnoscience with science learning? (Q3). 4) Is the research methodology described in the article? (Q4). 5) Does the article mention which aspects of Indonesian culture are the focus of the research? (Q5). 6) Does the article mention the subject name that integrates with ethnoscience in learning? (Q6). 7) Does the article mention the educational level targeted by the research? (Q7). 8) Does the article mention the form of ethnoscience integration in science learning? (Q8).

Each question has a score of 1 for a "yes" answer and a score of 0 for a "no" answer. The total score (TS) is obtained by summing up the scores from each question. Furthermore, the "eligible" category is assigned to articles that have a total score within the range of $7 \leq TS \leq 8$, but the scores for answers Q1 and Q2 must not be 0 as they are related to the research topic objective. The categorization of "eligible" is intended to determine whether an article has the supporting components to be used as a reference for research related to the topic of ethnoscience in science learning as the implementation of the Kurikulum Merdeka in Indonesia or not.

Analysis and Data Classification

The fourth stage of this research is to conduct an analysis and classification of the scientific articles obtained from the previous stages. The analysis is performed on the eligible articles, taking into consideration the quality components. Subsequently, classification is carried out based on the results of the analysis. The intended classifications are as follows: 1) Indonesian culture integrated into science learning in research related to the topic of ethnoscience in science learning as an implementation of Kurikulum Merdeka in Indonesia; 2) Educational levels targeted in research related to the topic of ethnoscience in science learning as an implementation of Kurikulum Merdeka in Indonesia; 3) Subjects integrated with ethnoscience in research related to the topic of ethnoscience in science learning as an implementation of Kurikulum Merdeka in Indonesia; and 4) Forms of integration between ethnoscience and science learning in research related to the topic of ethnoscience in science learning as an implementation of Kurikulum Merdeka in Indonesia.

Result and Discussion

The first stage, which is the search for journal articles using the keywords "ethnoscience curriculum merdeka" on Google Scholar, yielded a total of 108 documents. However, after data filtering based on the predetermined limitations, the number of articles was reduced to 6 documents. Information regarding these six articles is presented in Table 1.

Based on the data provided in Table 1, it can be observed that research articles on the topic of ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia were published in SINTA-accredited journals with rankings of 3, 4, and 5. This indicates that research on the topic of ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia has not been published in SINTA-accredited journals with rankings of 1 and 2. However, it should be noted that journals with such accreditation are widely used as references in Indonesia (Fitriani & Prahmana, 2021; Santosa & Hasibuan, 2022; Sari et al., 2023). Additionally, Table 1 shows that the publication years of research articles on the topic of ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia are predominantly in 2023. This indicates an increasing number of studies, suggesting that research on the topic of ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia is gaining attention among researchers. However, it cannot yet be categorized as a trend. Based on these two pieces of information, it can be concluded that research on the topic of ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia is still limited, and further research is needed to provide more extensive and in-depth information on this topic.

Table 1. List of Filtered Articles

Article Title	Authors	Journal Acreditation	Article Code
Identifikasi Indigenous Knowledge Suku Sasak Sebagai Upaya Pengembangan Pembelajaran Biologi Untuk Mendukung Konsep Merdeka Belajar	Muchsin et al. (2023)	SINTA 3	A1
Pengembangan Media Google Sites Berbasis Ethno Sains pada Mata Pelajaran IPAS Sekolah Dasar	Putri et al. (2023)	SINTA 3	A2
Pengembangan Modul Kimia Etnosains Terintegrasi Model Culturally Responsive Transformative Teaching (CRTT)	Adawiyah et al. (2022)	SINTA 4	A3
Validitas dan Praktikalitas Modul Reaksi Kimia Berbasis Guided Discovery Learning Terintegrasi Etnosains untuk Fase E SMA	Yani & Yerimadesi (2023)	SINTA 4	A4
Pengembangan E-Modul Kimia Larutan Terintegrasi Etno-STEAM Bahan Kajian Batik Pekalongan	Fikrina et al. (2023)	SINTA 5	A5
Pengembangan LKPD Digital Berbasis Etnosains Melayu Riau pada Muatan IPA Sekolah Dasar	Fitriyeni (2023)	SINTA 5	A6

The next step is to assess the quality of the selected articles by assigning scores based on the answers to the established questions (Q1-Q8). The results of the quality assessment of the selected articles are presented in Table 2.

Table 2. Quality Assessment of Selected Research Articles Results

Article Code	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	TS
A1	1	1	1	1	1	1	1	1	8
A2	1	1	1	1	0	1	1	1	7
A3	1	0	1	1	1	1	1	1	7
A4	1	1	1	1	0	1	1	1	7
A5	1	0	1	1	1	1	1	1	7
A6	1	1	1	1	1	1	1	1	8

Based on the quality assessment results shown in Table 2, it can be observed that the articles with a total quality score of $TS = 8$ are the ones written by Muchsin et al. (2023) and Fitriyeni (2023) while the articles with a $TS = 7$ are the ones written by Putri et al. (2023), Adawiyah et al. (2022), Yani & Yerimadesi (2023), and Fikrina et al. (2023). However, only the articles written by Muchsin et al. (2023), Fitriyeni (2023), Putri et al. (2023), and Yani & Yerimadesi (2023) can be categorized as "eligible" because the articles written by Adawiyah et al. (2022) and Fikrina et al. (2023) have a score of 0 for Q2. This means that the four articles, namely A1, A2, A4, and A6, have components related to information about research on the topic of ethnoscience in science learning as the implementation of the Kurikulum Merdeka. Therefore, these four "eligible" articles can be used as references for research related to the topic of ethnoscience in science learning as the implementation of the Kurikulum Merdeka.

Based on the quality assessment and analysis conducted on the six articles, they can be classified based on the integration of Indonesian culture in science learning, educational levels, subject areas, and the forms of ethnoscience integration in science learning. The first classification is related to the integration of Indonesian culture into science learning. Among the six articles in Table 1, only articles A1, A3, A5, and A6 mention the specific Indonesian cultures that are integrated into science learning. The article written by Muchsin et al. (2023) integrates the culture of the Sasak tribe, while Adawiyah et al. (2022) integrate the culture of Central Lombok Regency, Fikrina et al. (2023) integrate the culture of Pekalongan batik, and Fitriyeni (2023) integrate the culture of Malay Riau.

Next, regarding the educational levels, the article written by Putri et al. (2023) and Fitriyeni (2023) discusses research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka at the elementary school level (SD). The articles written by Muchsin et al. (2023), Adawiyah et al. (2022), Yani & Yerimadesi (2023), and Fikrina et al. (2023) discuss research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka at the high

school level (SMA/MA). Thus, it can be concluded that research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka is more commonly conducted at the high school level. This may be due to the fact that at the high school level, science subjects are divided into specific fields, such as Biology, Physics, and Chemistry, unlike the elementary and middle school levels where science is taught in an integrated manner. However, based on these findings, it is important to note that research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia needs to be conducted at the middle school level (SMP), as no published research articles have been found for that level within the range of 2022-2023.

Furthermore, regarding the subjects, the article written by Putri et al. (2023) and Fitriyeni (2023) discusses research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka in the subject of science at the elementary school level (SD). The article written by Muchsin et al. (2023) discusses research on ethnoscience in biology as an implementation of the Kurikulum Merdeka at the high school level (SMA/MA). The articles written by Adawiyah et al. (2022), Yani & Yerimadesi (2023), and Fikrina et al. (2023) discuss research on ethnoscience in chemistry as an implementation of the Kurikulum Merdeka at the high school level (SMA/MA). Thus, it can be concluded that research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka is more commonly conducted in the science subject at the elementary school level and in chemistry at the high school level. However, based on these findings, it can be said that research on ethnoscience in science learning as an implementation of the Kurikulum Merdeka in Indonesia needs to be conducted in the subject of physics, as no published research articles have been found for that subject within the range of 2022-2023.

Furthermore, regarding the integration of ethnoscience in science learning, the article written by Muchsin et al. (2023) describes the culture of the Sasak ethnic group that can be integrated into the Biology subject, specifically in teaching topics related to Biodiversity, Ecosystems, and Waste and Natural Materials at the high school level (SMA/MA). The article written by Putri et al. (2023) explains how ethnoscience can be integrated into learning resources based on Google Sites in the teaching of the IPAS (Science and Social Studies) subject at the elementary school level (SD). The article written by Fitriyeni (2023) discusses the integration of ethnoscience into digital student worksheets (LKPD) in the teaching of the Science subject at the elementary school level (SD). The articles written

by Adawiyah et al. (2022), Yani & Yerimadesi (2023), and Fikrina et al. (2023) describe how ethnoscience can be integrated into module-based teaching materials in the Chemistry subject at the high school level (SMA/MA). Thus, it can be concluded that research on ethnoscience in science learning as an implementation of the Merdeka Curriculum is predominantly integrated into instructional materials or learning resources.

Conclusion

Through the use of a Systematic Literature Review (SLR) on six articles in six accredited Sinta 3, 4, and 5 scientific journals related to research on ethnoscience in science learning as the implementation of the Merdeka Curriculum in Indonesia, it was found that four out of the six articles qualify as "eligible," meaning that these four articles can be used as references for research on the topic. The six articles were also classified based on the Indonesian culture integrated in science learning, educational levels, subjects, and forms of ethnoscience integration in science learning.

Author Contributions
The main author, Heni Yunilda Hasibuan, contributed to the research design, instrument preparation, conducting the research, collecting and analyzing data, as well as writing the article. The fourth author, Cecep Anwar Hadi Firdos Santosa, were also involved in the research design, data analysis, and article writing. The second and third authors, Encep Syarifudin and Suherman, guided throughout the research process and contributed to the article writing.

Conflicts of Interest
The authors declare no conflict of interest.

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