



Bibliometric Research Trends of Local Wisdom in Science Education: Mapping Publications, Collaborations, and Implications

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Abstract

This study aims to map research trends related to local wisdom in educational science through a bibliometric approach. By analyzing 64 articles obtained from the Scopus database from 2009 to 2024, this study explores publication patterns, cross-country collaborations, dominant keywords, relevant topics, and their implications. The analysis was carried out with the help of the R program application. The results show that publications related to local wisdom have experienced a significant increasing trend from previous years. Indonesia is the main contributor with institutional affiliations such as Padang State University and Surabaya State University. Local wisdom keywords dominate with a strong relationship to science learning and character education. This study is able to provide an overview of the importance of research related to local wisdom related to educational science and provide important insights regarding the integration of local wisdom in science to support the sustainability of local culture while meeting the challenges of global education. Keyword co-analysis reveals that “local wisdom” frequently co-occurs with themes such as science education, character education, and ethnoscience, reflecting efforts to contextualize science learning within cultural frameworks. While the integration of local wisdom presents potential for curriculum development and culturally responsive pedagogy, these implications should be interpreted within the scope of the descriptive bibliometric findings. Further research is recommended to explore practical models and cross-national collaboration strategies. Future recommendation is for developing a model for integrating local wisdom into STEM and character-based education.

Keywords: Bibliometric, Local Wisdom, Science Education

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INTRODUCTION

The development of technology and globalization has had a significant impact on local cultures in various parts of the world. Globalization has resulted in a shift in traditional values and created challenges for the preservation of local cultures (Tu et al., 2019; Sari et al., 2022). The flow of global culture often leads to the homogenization of local identities, which can threaten existing cultural diversity (Kerubo, 2024; Ayatullah et al., 2024). However, technology can also be a dual tool, which not only threatens local culture but also provides new channels for its preservation (Castells, 2015; Krisnanik et al., 2023). Therefore, an appropriate strategy is needed to preserve and strengthen local culture amidst the flow of globalization.

Various efforts have been made to preserve local culture in the face of the challenges of globalization. Integration of local cultural knowledge and practices into formal systems is considered essential to promote sustainable development and cultural diversity (Unesco, 2024).

Revitalization of local languages and cultural festivals is a key strategy in maintaining cultural identity in the global era (Aryani et al., 2023; Kiarie, 2024). Cultural and digital literacy also play an important role in helping the younger generation understand and appreciate their cultural heritage (Yusuf, 2024). Thus, local culture can survive and thrive even in the midst of globalization.

Education plays an important role in preserving local culture, especially through local wisdom-based learning. Integrating local wisdom into the education system can bridge the gap between traditional knowledge and modern learning (Sari et al., 2024). Curriculum that integrates local cultural elements has been shown to improve students' understanding of traditions and values relevant to their environment (Sukry et al., 2018). In this context, education functions as a bridge connecting the past, present, and future in an effort to preserve culture. Therefore, the education system must be designed in such a way as to be able to preserve and promote local culture.

One approach that is increasingly relevant is local wisdom-based learning as a cultural reinforcer. Local wisdom-based learning not only increases students' understanding of their culture but also strengthens cultural identity (Sumarmi et al., 2024). The integration of local wisdom into the curriculum has shown an increase in students' sense of belonging to their community (Rasna & Tantra, 2017). Local wisdom is key to creating culturally relevant and sustainable education (Nakaya, 2018). Thus, local wisdom-based learning is an important strategy in preserving local culture through education.

Based on existing data, there have been many studies analyzing the effectiveness of local wisdom-based learning. However, bibliometric research mapping local wisdom research trend in education is still lacking. (Muhammad et al., 2022) shows that the global research trend in local wisdom is increasing, especially conducted by Indonesian researchers. However, this study only uses the keyword local wisdom that does not include the keyword Science and does not separate articles containing education. Most bibliometric research are still non-educational in nature by discussing certain fields such as agriculture (Limpo et al., 2022; Miharja et al., 2022), Health (Widyarani et al., 2020), law (Dewi et al., 2021), and others. In addition, most bibliometric studies discussing about local wisdom in education are still limited to national scope. These studies are generally published in local journals and not many are indexed in global databases such as Scopus (Setianingrum et al., 2023). Therefore, this study will address the literature gap related to bibliometrics in current local wisdom on local wisdom in education.

Although many studies analyze the effectiveness of local wisdom-based learning, there is still a lack of bibliometric research that maps research trends in local wisdom in education. (Muhammad et al., 2022) shows that the global research trend in local wisdom is increasing, especially conducted by Indonesian researchers. However, this study only uses the keyword local wisdom and does not include the keyword Science and does not separate articles that include education. Furthermore, most bibliometric research is still non-educational in nature by discussing certain fields such as agriculture (Limpo et al., 2022; Miharja et al., 2022), Health (Widyarani et al., 2020), law (Dewi et al., 2021), and others. In addition, most bibliometric research on local wisdom in education uses a national scope and very little international or indexed in global databases such as Scopus (Setianingrum et al., 2023). Therefore, this study will address the literature gap related to bibliometrics in current local wisdom on local wisdom in education.

Through bibliometric analysis, this study will map research trends related to local wisdom in education. Bibliometric analysis provides a systematic way to identify publication patterns, research collaborations, and emerging topics in a particular field (Aria & Cuccurullo, 2017). Bibliometric mapping can reveal the intellectual structure and evolution of a research domain (Liu et al., 2019). This method is very useful in identifying research gaps and future directions in interdisciplinary fields (Abdullah et al., 2023). By mapping these trends,

researchers can understand how far the study of local wisdom in education has developed and identify directions for further research.

Based on this background, this study attempts to answer several main questions related to local wisdom in education. How has the research trend on local wisdom in education developed in recent decades? What are the main topics that have been studied in relation to local wisdom and education? What is the role of local wisdom in strengthening cultural identity through the education system? By answering these questions, this study is expected to provide significant contributions to efforts to preserve culture through the integration of local wisdom in education.

METHOD

This study aims to map how the development of research trends related to the topic of local wisdom. The methodology used in this study is the bibliometric method. The bibliometric method is a quantitative research method which is a method that combines statistics with mathematics with the aim of being able to see the relationship between various studies in a field (Kilinc, 2024). Bibliometric methods are widely used to explore development trends and research boundaries whose data is obtained through scientific literature (Prasetyadi & Kamaludin, 2023). Scientific literature used as research data is taken through the dataset owned by Scopus, this is because Scopus is able to identify articles through keywords more precisely and has more articles compared to Web of Science.

Data from the study obtained through the Scopus dataset which is one of the journal indexing that has been trusted internationally. Furthermore, the researcher used the PRISMA model to filter articles as research data. This PRISMA model is used to provide assurance that the data used in the study for analysis is truly objective, transparent and clear data by applying the criteria determined by the researcher (Rai et al., 2021). The use of this Prisma model will certainly guarantee the validity of the data, because the data filtering process goes through the existing steps. The criteria for determining relevant articles are explained in the PRISMA stages in the paragraph below.

The first step taken to collect the dataset is to use keywords to search for articles related to the topic of local wisdom on the Scopus search engine is to use the keywords Local Wisdom AND science, besides that the keyword ethnoscience is not selected because the articles displayed are already included in the article with the keywords local wisdom and science. This first stage also limited the publication year from 2009 to 2024 and all articles must be in English, so that 213 publications were obtained in the form of books, conference papers and articles.

The second stage is to conduct screening through the type of publication, where the type of publication is limited to only publications in the form of articles used, so that 98 articles were obtained. The third stage is to conduct screening through a feasibility test of the data by seeing whether the existing data is relevant to the topic of the research objective, so that 64 documents were obtained. All screening stages are carried out through manual review of articles that meet the criteria, especially those all with the topic of local wisdom and science education. Especially related to abstracts and keywords, manual sorting is carried out by reading related articles. The topic of education is intended for the application or implementation of local wisdom in science education, especially in schools.

The results of the three screening stages produce articles that are in accordance with the research topic and guarantee the validity of the data because they have gone through a strict process. So in the last stage is to state that there are 64 articles that are suitable for use as a dataset to find out how research trends are related to local wisdom. The diagram of the screening stages can be seen in Figure 1.

This study is a study to determine the trend of research related to the topic of local wisdom so that a bibliometric analysis model is used. Bibliometric analysis in this study uses

the help of the R and VOSviewer program applications. The analysis that is the focus of the study is related to the number of publications related to local wisdom from 2009 to 2024. In addition, the analysis will also see which articles have the most citations related to the topic of local wisdom and which authors have published the most related articles on the topic of local wisdom. To strengthen the results of the analysis, it will also be shown which universities are the most affiliated with publications, the most used keywords, and which countries publish the most and collaborative publication relationships between countries related to the topic of local wisdom. The last is an analysis related to the relationship between local wisdom keywords and other research topics.

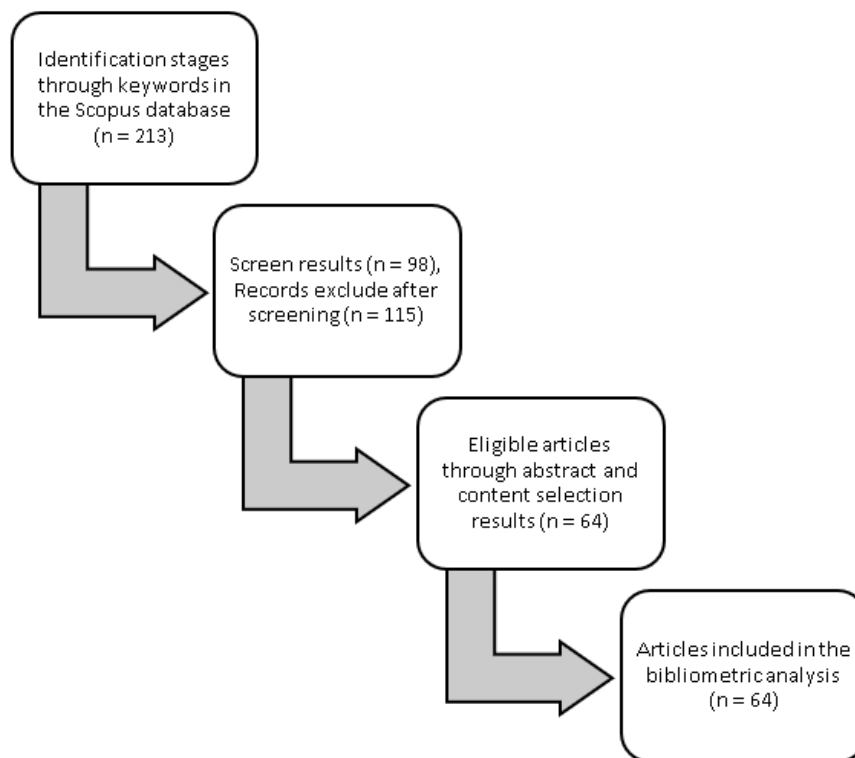


Figure 1. Flowchart of PRISMA Model Criteria

RESULTS AND DISCUSSION

The following research results are the results of bibliometric analysis using the R program with the results displayed according to the research questions. The results displayed will be able to answer research questions related to local wisdom research trends. The mapping of the results of the relationship between articles based on keywords uses the help of Vosviewer. The results of the analysis such as the main information can be seen in Figure 2.

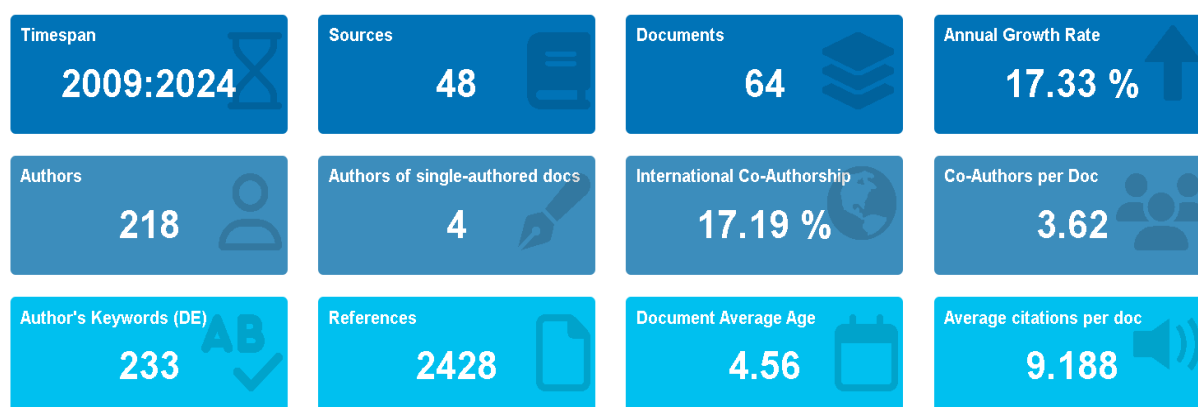


Figure 2. Main Information

Figure 2 provides an initial summary of the bibliometric analysis related to local wisdom in education of 64 documents published from 2009 to 2024. There are 48 contributing sources with a total of 218 authors, 4 of whom are single authors. Documents with collaboration between authors in each country show a percentage of 17.19% while the total number of cited references is 2428. The annual growth of identified publications shows a positive trend of 17.33%.

The publication growth rate of 17.33% per year indicates a significant acceleration in academic interest in the integration of local wisdom in education, in line with the paradigm of decolonization of education which emphasizes the importance of local knowledge as an alternative to Western epistemology.(Knobloch, 2020; Omodan, 2024). This phenomenon also reflects the academic response to the Sustainable Development Goals (SDGs), especially target 4.7, which emphasizes education for sustainable development and respect for cultural diversity.(UNESCO, 2017). The low percentage of international collaboration (17.19%) reflects the characteristics of local wisdom research which tends to be contextual and tied to the specific culture of a region, where local wisdom has unique characteristics that are difficult to transfer across cultures without in-depth adaptation.(Gay, 2018). The ratio of 218 authors to 64 documents (an average of 3.4 authors per article) indicates collaboration within the research team, although there are still 4 single authors indicating individual research in this area.

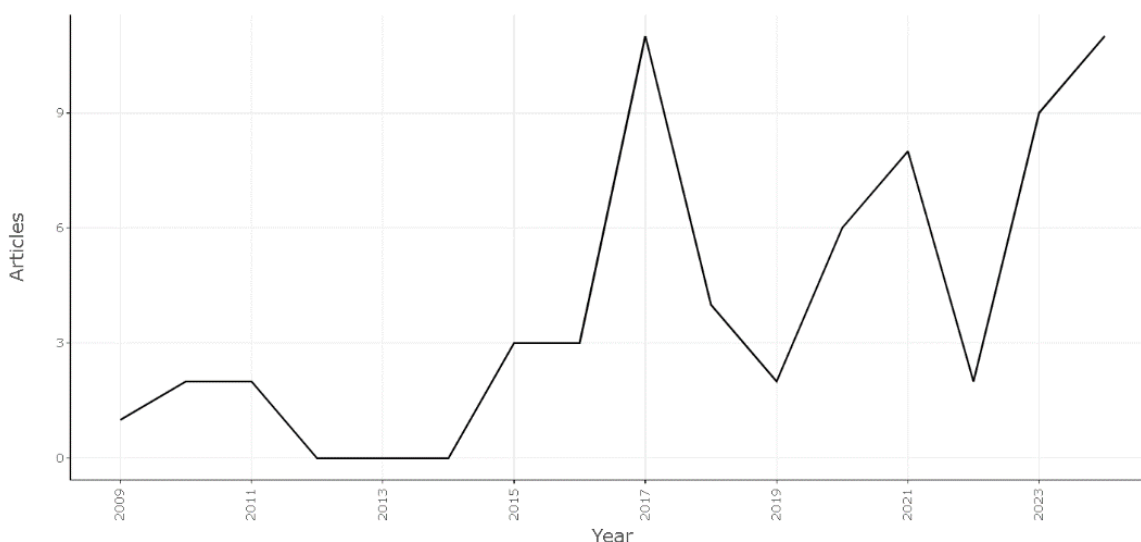


Figure 3. Publication Trend

The publication trend analysis in Figure 3 shows a fluctuating pattern. The period 2009-2016 shows gradual growth reflecting the early phase of academic awareness of the importance of local wisdom in education. The 2017 spike can be attributed to the global momentum related to the implementation of SDGs which began to intensify in that period, in line with the findings of Suswandari (2017) who identified increasing global attention to the preservation of local culture through education. The decline that occurred in the 2018-2019 period can be attributed to the complexity of integrating traditional knowledge into the modern education system.(Zidny et al., 2020). This phase reflects the practical challenges in operationalizing theoretical concepts into concrete pedagogical contexts. An interesting phenomenon occurred during the early COVID-19 pandemic period (2020-2021), where publications actually increased. This can be explained through the theory of crisis-driven innovation(Wenzel et al., 2021), where global disruption drives the search for alternative epistemologies that are more resilient and contextual.(Wenzel et al., 2021). This increase also reflects a global paradigm shift towards a more holistic and contextual approach to education (Herrington & Reeves,

2011). The 2022 decline indicates a maturation phase of the field after a period of intensive exploration during the early pandemic, possibly related to thematic saturation or a reorientation of research focus. The increase in publications in the 2023-2024 period suggests that the integration of local wisdom has found a new balance in academic discourse.

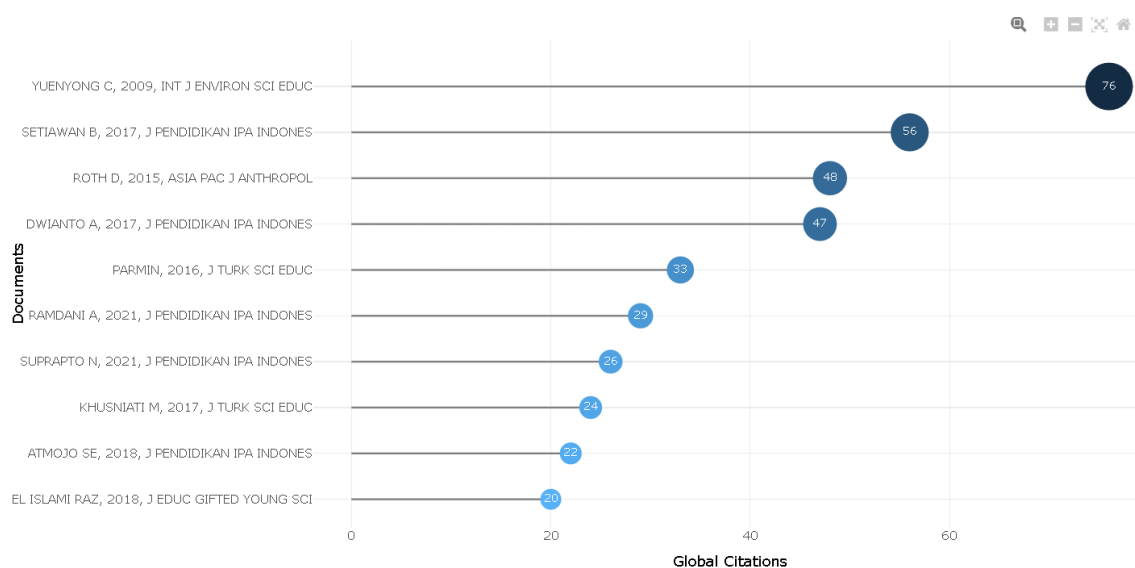


Figure 4. Top 10 Global Citations

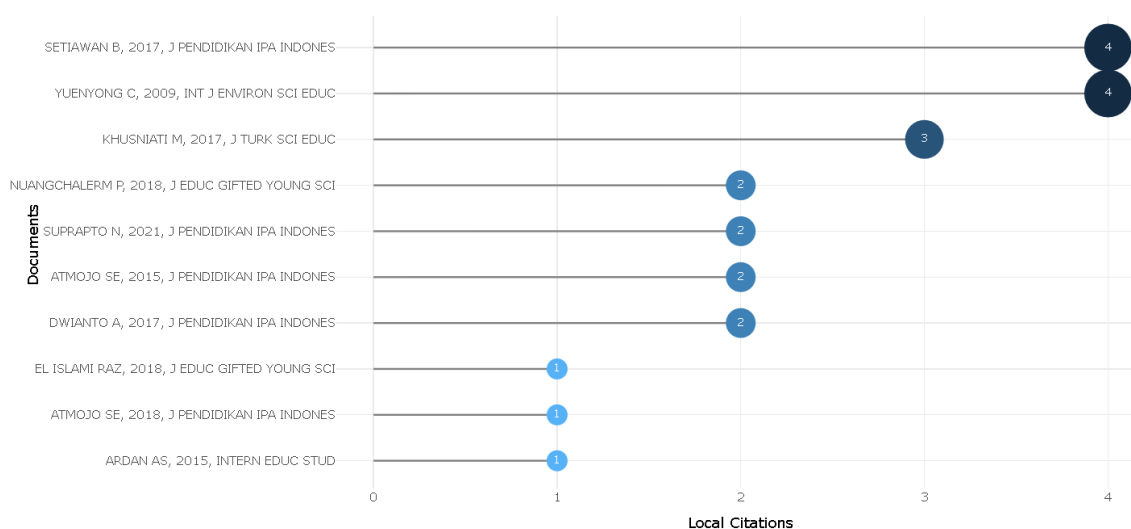


Figure 5. Top 10 local citations

Global citation analysis in Figure 4 shows the dominance of Yuenyong's (2009) article with 76 citations, followed by Setiawan (56 citations) and Roth (48 citations). Meanwhile, at the local level as shown in Figure 5, Setiawan (2017) leads with 4 local citations, followed by Yuenyong (4 citations) and Khusniati (3 citations). The uneven distribution of global citations contrasts with the more even local citation pattern, indicating the characteristics of a field that is still in the development stage with the dominance of several pioneering works.

The dominance of citations to Yuenyong's article can be explained by its position as one of the earliest publications in the bibliometric dataset since 2009 that developed a conceptual framework for the integration of local wisdom in science literacy, making it a key reference in the field. Juxtaposed with Figure 5, Setiawan's dual position in the global (2nd) and local (1st) rankings shows the important contribution of researchers from developing countries in the

development of local wisdom-based science education. The more even citation pattern at the local level can be caused by the characteristics of local wisdom research which tends to be specific to certain cultural and geographical contexts. Each local wisdom research usually focuses on a specific community or region with different cultural characteristics.(Sotero et al., 2020), so that the research results have more limited relevance to be generalized to other contexts. While the large citation gap between the top articles and others indicates the characteristics of a field that is still emerging with few influential works.

Yuenyong's (2009) research reflects the fundamental influence of the concept of "two knowledge systems" in forming a new paradigm of science education that integrates traditional and modern epistemology. His article offers a conceptual framework that balances local wisdom with science and technology for sustainable development, making it a primary reference in the discourse of integrating local wisdom with scientific literacy. Meanwhile, the contribution of Setiawan et al., (2017) lies in the practical implementation through the development of local wisdom-based learning modules that have been proven to improve students' scientific literacy. Setiawan's approach that focuses on the development of local context-based teaching materials provides a complementary contribution to Yuenyong's theoretical framework, demonstrating the evolution of the field from conceptualization to practical application.

The theoretical implication of the dominance of these two works is a shift from a universalist approach to a pluralist approach in scientific literacy, where the validity of knowledge is no longer determined by a single standard but rather by cultural context (Hansson, 2018). This conceptual framework enables science learning that values and utilizes local wisdom as a source of knowledge that is equal to modern science, not just a complement or illustration.

Table 1. Author publication

Author	Article
The Islamic Era	3
Nuangchalerm P	3
Prasetyo ZK	3
Wilujeng I	3
Atmojo SE	2
Diliarosta S	2
M.	2
Parmin	2
Sudarmin	2
Suma K	2

The distribution of author productivity based on Table 1 shows a pattern of concentration of expertise with 4 most productive authors (3 articles each) and 6 authors with 2 articles. The dominance of Indonesian researchers in this list (9 out of 10) confirms Indonesia's important position in local wisdom education research. This productivity pattern reflects the characteristics of a field that is still developing, where a large-scale research community has not yet formed. The concentration of productivity in only a few individuals indicates a field that is still in its early stages of development (Muteesasira et al., 2024). The dominance of Indonesian researchers can be explained through the superiority of local researchers in local wisdom research, where local researchers have the advantage of having better insight in describing the social and cultural characteristics of the group being studied (Suwankhong & Liamputtong, 2015). This also reflects Indonesia's academic response to the country's rich cultural diversity.

Table 2 revealed that the most frequently used keyword in research related to local wisdom in education is "local wisdom", which appears 33 times. This high frequency shows

that local wisdom is the main axis and theoretical basis in the discourse of education based on local culture. Lower frequencies were found in the keywords "science learning" (4 times), as well as "character education", "ethnoscience", "indigenous science", and "*science literacy*" (each 3 times) has which suggests that the keywords are often used as a framework to link various pedagogical approaches. This is in line with the view of Febrian et al., (2024) which states that the integration of local wisdom and traditional knowledge in science education is a central issue in supporting the Education for Sustainable Development (ESD) agenda.

Table 2. Most frequently used keywords

Word	Occurrences
Local Wisdom	33
Science Learning	4
Character education	3
Ethnoscience	3
Indigenous science	3
Indonesia	3
Science literacy	3
Baduy society	2
Character	2
Development	2

In addition, the appearance of the word "Indonesia" three times reflects that the focus of research is still largely in the national context, reinforcing the understanding that the development of local wisdom is contextual and region-based. Meanwhile, the appearance of the word "Baduy's society" twice shows an interest in ethnopedagogical studies that highlight certain indigenous communities, although the scope is still relatively limited.

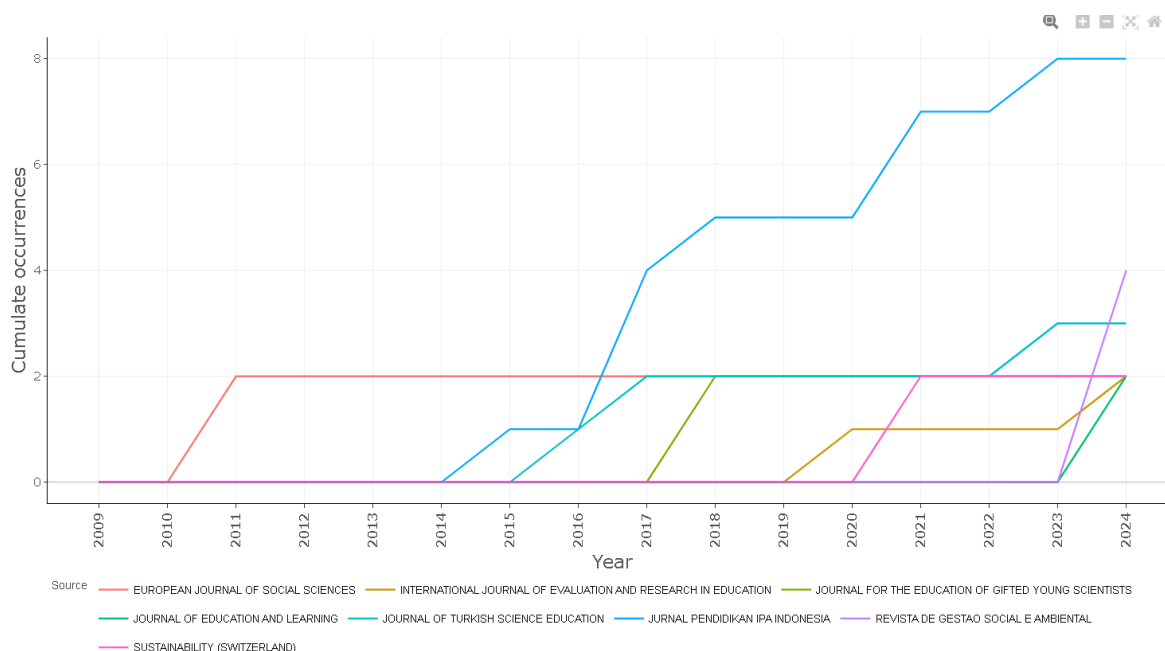


Figure 6. Journal publication trends

Furthermore, the journal publication trend is presented in Figure 6, Indonesian Science Education Journal showed the most stable growth starting in 2014 with a rapid increase until 2024. The Journal of Turkish Science Education showed a similar growth pattern starting in 2015. Dominance of Indonesian Science Education Journal in local wisdom publications shows a special focus and editorial policy that supports local knowledge research. The continued

growth pattern until 2024 shows that this field is becoming increasingly established in the world of academic publication.

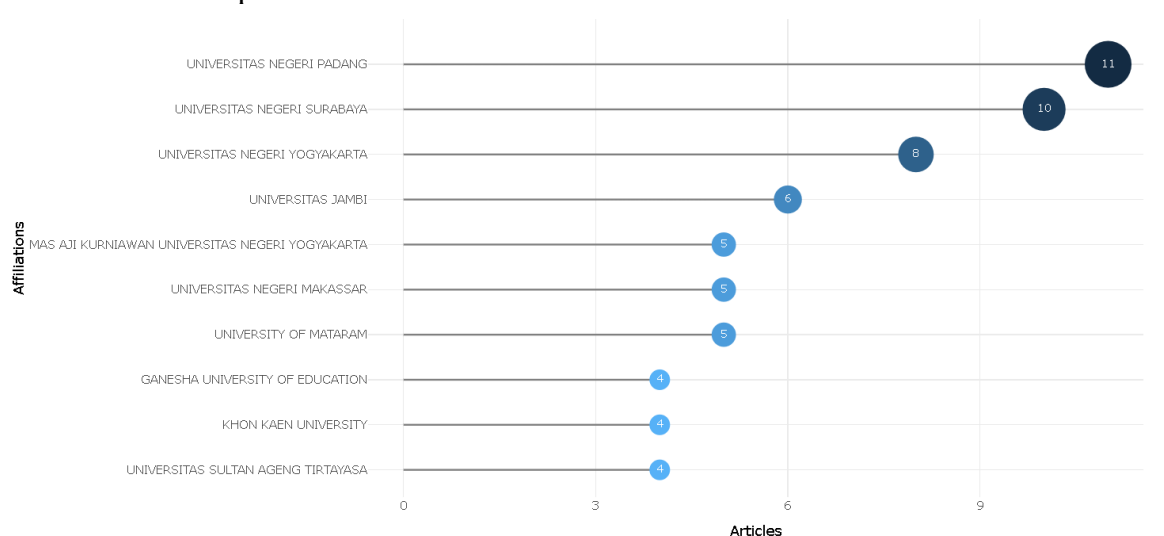


Figure 7.Most Relevant Affiliations

The search for publications on the topic of local wisdom in education shows the contribution of various academic institutions around the world. This is shown through the most relevant affiliations in Figure 7. Padang State University leads with 11 articles, followed by Surabaya State University (10) and Yogyakarta State University (8). These three institutions make a positive contribution in encouraging the integration of local wisdom into science education which reflects a commitment to contextual education based on local culture. This institutional dominance reflects the commitment of Higher Education to contribute to preserving local wisdom knowledge into the formal education framework. The trend of the most relevant affiliations in publications on related topics shows the dominance of Indonesian universities. This is inseparable from the wealth of local wisdom possessed by the country. This analysis is strengthened by the identification of the country's contribution to local wisdom studies based on the number of related authors presented in Table 3.

Table 3.Country Scientific Production

Country	Frequency
Indonesia	181
Thailand	27
Malaysia	9
China	6
Australia	2
Brazil	1
Netherlands	1
Nigeria	1
Oman	1
Poland	1

The dominance of a country in scientific contributions related to local wisdom in education not only shows the quantity of publications, but also reflects the strong integration between local culture and the field of education. It is known that Indonesia is the country with the most authors related to the topic of local wisdom with a total of 181. This figure is far behind the second country, namely Thailand with 27, followed by Malaysia with 9. Then China with a total of 6 and Australia with 2. While for countries such as Brazil, the Netherlands,

Nigeria, Oman, and Poland each have 1 author. Indonesia is a country that has a variety of local wisdom spread throughout the region. This strengthens Rusilowati's findings in Ridho et al (2021) which states that the diversity of local wisdom owned by Indonesia ranging from moral messages, forms of monuments, to the use of natural resources as medicines can be integrated into learning materials. The diversity of local wisdom in Indonesia is a strong capital in efforts to empower cultural potential that is internalized in the world of education so that it can produce superior and cultured generations. (Mayasari, 2017). Indonesia's dominance cannot be separated from the socio-cultural reality of Indonesia which is rich in local wisdom values and educational policies that support the development of contextual curriculum. Indonesian educational policies such as the Pancasila Student Profile in the Merdeka curriculum embody character education that is derived from the values of the nation's local wisdom. Character education carried out in the Merdeka Curriculum mission emphasizes the importance of strengthening character values that are integrated into all school activities, so that the actualization of the nation's cultural values rooted in local wisdom can be reflected in real life. (Seno et al., 2022).

Research on local wisdom in education originating from Sub-Saharan African countries is still very limited. One of the main causes is the strong influence of the colonial educational legacy, which emphasizes Western-based curricula and pedagogical approaches. As a result, local knowledge widely known by African communities is difficult to integrate into learning curricula or become the focus of research agendas. (Ezeanya & Esiobu, 2019). The Great (2015) states that indigenous knowledge can only be fully recognized if it is integrated comprehensively into the educational curriculum and its role is widely socialized. Therefore, an educational policy is needed that encourages researchers in Africa to reconstruct and reintegrate local knowledge systems into educational research and practice. The same problem also occurs in research on local wisdom from Latin American countries where the dominance of the Western educational paradigm encourages the need for efforts to protect and promote the languages and cultures of indigenous peoples, which then gives rise to various educational policies, including those related to participation in international forums. (Szelivánov, 2020). This analysis continues by looking at state collaboration in local wisdom research in science education.

Table 4. Country Collaboration Map

Country		Article
Australia	Nigeria	1
Indonesia	Australia	1
Indonesia	China	1
Indonesia	Malaysia	1
Indonesia	Netherlands	1
Indonesia	Oman	1
Indonesia	Poland	1
Indonesia	South Africa	1
Indonesia	Thailand	1
Oman	South Africa	1
Thailand	Brazil	1

Table 4 shows that country collaboration in research related to local wisdom in science education still tends to be low. Each country collaborated in at least 1 publication except for the collaboration between Indonesia and Thailand which contained 3 publications. The low collaboration in research related to local wisdom in education because local wisdom is very contextual and highly local, so it is less interesting for researchers who focus more on global, technical, or STEM (Science, Technology, Engineering, and Mathematics) issues. Apart from

that, what is interesting is that every collaboration between countries is dominated by Indonesia as the partner country. This pattern shows Indonesia's central role in research local wisdom in education, while indicating the potential for expanding international collaboration networks in the future. The focus on local wisdom is more prominent in Indonesia, perhaps reflecting its specific needs and cultural richness. This emphasis can be seen as a response to global issues such as decolonization of the curriculum and the SDGs, with the aim of preserving cultural heritage while preparing students to face global challenges.(Setiawan et al., 2017). The collaboration of each country above is clarified by the visualization of Figure 8.

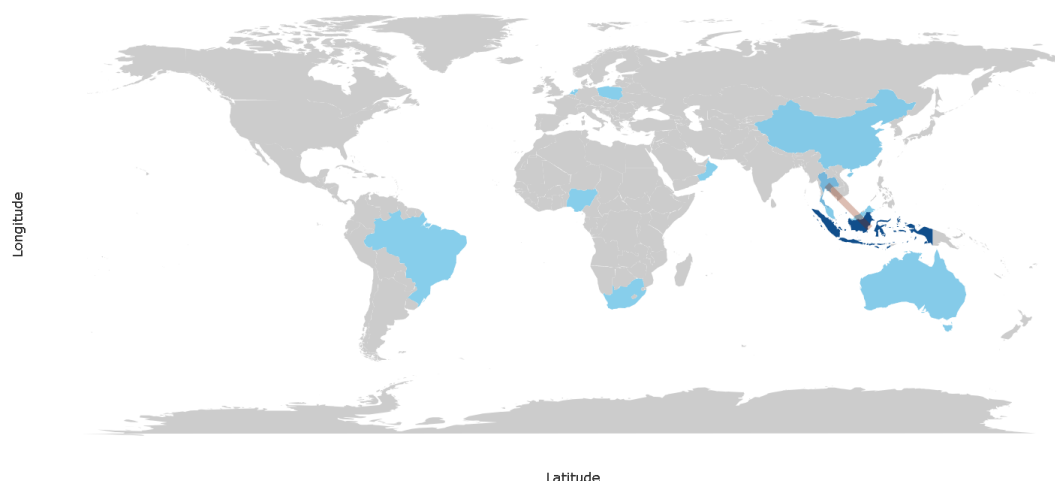


Figure 8. Country Collaboration Map

Based on Figure 8, Indonesia appears as a center for international collaboration in research related to local wisdom in education. This is shown through the dark blue color which marks the intensity of Indonesia's involvement in publications with other countries. Other countries involved such as Thailand, Australia, China, Nigeria, and Brazil are marked in light blue, reflecting a lower intensity of collaboration. Indonesia's dominance in this collaboration map indicates Indonesia's central role as a knowledge hub in the field of local wisdom. This is in line with the characteristics of education in Indonesia which is starting to provide space for the integration of local culture in the curriculum and learning practices. According to Suprpto et al (2021) Indonesia's educational framework is directed at strengthening three main dimensions, namely mastery of knowledge, scientific skills, and scientific attitudes that can be applied in everyday life and interacting with the community and the surrounding environment. This integration allows students to use local wisdom as a source of learning and at the same time strengthen cultural identity in the learning process. In addition to Indonesia, Asian countries such as China, Malaysia, Thailand also participate in research related to local wisdom in learning. These countries encourage research and preservation of local wisdom as part of an educational strategy aimed at strengthening cultural identity, responding to socio-economic challenges, and promoting national and regional cultural wealth amidst the flow of globalization (Lestari et al., 2024).

Figure 9 shows that publications related to local wisdom cover several discussion topics ranging from Science Literacy, Indigenous Science, character education, ethnoscience, and others. These topics show the great potential of local wisdom for further research to continue to be adapted and applied in the world of education. The visualization analysis of keyword networks reveals "local wisdom" as a central concept connected to various research topics, indicating a major focus on integration local wisdom in education. The strong association of "local wisdom" with "science learning," "ethnoscience," and "indigenous science" reflects significant efforts to integrate traditional knowledge into formal science education, in line with global trends emphasizing contextualization of learning (Snively & Williams, 2016).

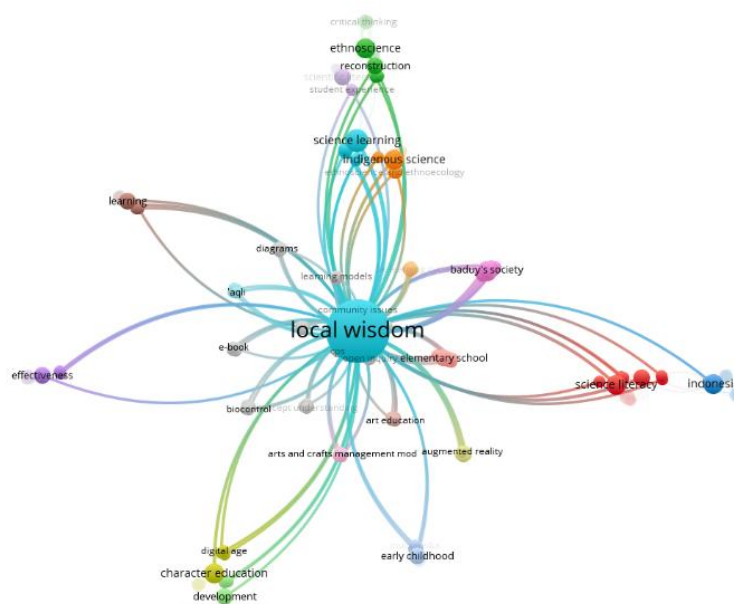


Figure 9. Topics related to local wisdom

The connection with “character education” suggests a holistic approach that combines cultural values with academic learning (Lickona, 2009). The focus on scientific literacy and character education demonstrates an awareness of the importance of equipping students not only with scientific knowledge, but also ethical values and critical skills to become responsible citizens in a global era (Chowdhury, 2016). The focus on “early childhood” and “elementary school” indicates the importance of instilling local values early on, consistent with Piaget’s theory of cognitive development (Piaget & Inhelder, 1969). The relationship with “augmented reality” and “e-books” reflects an innovative adaptation in bridging traditional knowledge with contemporary learning methods (Akçayır & Akçayır, 2017).

In addition to being a connection center in the integration of local wisdom into education, the visualization in Figure 9 also shows that technology-based topics such as augmented reality (AR), virtual reality (VR), and e-books still appear in limited numbers in the keyword network. This limitation shows that although digital technology offers innovative opportunities to bridge traditional knowledge with contemporary learning methods, its use in the context of local wisdom-based education is still not optimal. One of the causes is the still significant digital divide in developing countries, especially between urban and rural areas, which has an impact on teachers' capacity to integrate technology with education. (Huang et al., 2024). On the other hand, challenges such as digital obsolescence, limited access, inclusivity issues, copyright, data security, and ethical considerations also hinder the process of comprehensive digitization of cultural knowledge. (Siliutina et al., 2024).

In general, compared to previous studies that tend to separate science education from local cultural contexts, this visualization shows a significant shift towards a more holistic integration, reflecting a new paradigm in education that recognizes the importance of socio-cultural contexts (Muyassaroh, 2024; Alghamdi, 2019). In a broader context, this trend can be seen as a response to globalization and an effort to preserve cultural identity while preparing learners for global challenges, in line with UNESCO's goal of promoting education for sustainable development (UNESCO, 2017). Overall, this visualization depicts a complex and multidimensional research landscape, where local wisdom is at the center of various efforts to increase relevance and effectiveness in education, not only aiming to improve understanding in education, but also to strengthen cultural identity and prepare young people to face the challenges of the 21st century.

CONCLUSION

The results of the study indicate that the integration of local wisdom in science education is increasingly relevant in the era of globalization, marked by increasing attention to this topic globally. Indonesia leads the contribution in this research, both in terms of the number of publications and collaborations. The main focus in related publications is on culture-based science literacy and character education. Although international collaboration is still low, great potential for further development is clearly visible. This study emphasizes the importance of local wisdom in strengthening cultural identity through the education system, especially in science learning and as a response to the needs of sustainable and contextual education. The results show that research related to local wisdom is still lacking in use of technology such as AR and e-books has not been widely used in local wisdom research in science education. These results indicate the importance of an interdisciplinary approach that combines science, educational technology, character education, and local cultural studies to expand the reach and impact of research.

RECOMMENDATION

Future research needs to explore more widely how local wisdom can improve the quality of science learning by enhancing collaboration across institutions and countries, diversifying the cultural context of study, and utilizing technology as a learning tool. So the recommendation Future research needs to be directed at developing a model for integrating local wisdom into STEM and character-based education, longitudinal studies to monitor research trends, and evaluating the readiness of teachers and schools to utilize culture-based technology. This approach can strengthen the position of local wisdom in global education while also addressing the challenges of internationalization.

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