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Research Trends of Local Wisdom-Based Media to Improve Science Literacy

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Abstract: Scientific literacy is the ability of individuals to understand and use scientific knowledge in asking questions, seeking information, explaining natural phenomena, and making decisions based on evidence. This literacy also includes awareness of the impact of science and technology on the environment, culture, and daily life, as well as encouraging active engagement with science-related issues. This study aims to identify and analyze research trends related to local wisdom-based media in improving scientific literacy. The method used is descriptive and analytical, with data obtained from documents indexed in Google Scholar and Dimensions.ai within the period of 2016–2025, using tools such as Publish or Perish and Dimensions.ai. The research procedure follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The analyzed data includes types of publications, sources of publications, and research titles. The analysis was carried out bibliometrically using VOSviewer software. The results show that the research trend on local wisdom-based media has shown a fluctuating pattern. From 2016 to 2019, the number of publications gradually increased. In 2020, there was a significant spike, followed by steady growth until 2024. The decline in 2025 is presumed to be due to the current year's data not being fully accumulated. Most documents are in the form of articles, books, proceedings, and monographs. Frequently appearing keywords in this research are: Scientific Literacy, Learning Media, Local Wisdom, Contextual Learning, and Science Education.

Keywords: Scientific Literacy; Learning Media; Local Wisdom; Contextual Learning; Science Education.

Introduction

The development of science and technology in the era of globalization demands that society possess strong scientific literacy skills. Scientific literacy not only encompasses the ability to understand scientific concepts, but also involves the ability to ask questions, seek information, explain natural phenomena, and make decisions based on scientific evidence (Juniawan et al., 2023; Parisu et al., 2025). Furthermore, scientific literacy plays a crucial role in raising individuals' awareness of the impact of science and technology on daily life, culture, and the environment (OECD, 2016).

However, Indonesian students' scientific literacy remains relatively low, as reflected in the results of the PISA assessment, which show that Indonesia ranks 62nd out of 71 countries (Syazali & Umar, 2022). This low level of scientific literacy is caused by various factors, such as the lack of contextual and meaningful learning, as well as limited availability of learning media relevant to students' lives (Parisu et al., 2025; Syazali & Umar, 2022).

On the other hand, contextual learning approaches that are relevant to students' real-life experiences are key to improving scientific literacy. One such promising approach is the integration of local wisdom or local culture into learning media (Syazali & Umar, 2022). This is in line with the study by Kasi et al. (2022), which shows that the integration of local knowledge into science learning not only enriches students' understanding of scientific concepts, but also contributes to the preservation of local culture and provides meaningful learning experiences. Local wisdom is the result of accumulated experience, values,

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and cultural practices of communities that have proven effective in maintaining balance in life and the environment. Integrating local wisdom into learning media is believed to bridge scientific concepts with the realities familiar to students, making the learning process more meaningful and applicable (Syazali & Umar, 2022; Juniawan et al., 2023). In addition to strengthening students' connection with scientific concepts, the integration of local wisdom also plays a role in shaping students' character through the internalization of noble cultural values (Suhartini et al., 2019).

Along with the growing attention toward contextual and culturally-based education, numerous studies have explored local wisdom-based learning media to enhance scientific literacy. Various media such as animated videos, ethnoscience-based digital comics, pop-up books, and interactive digital tools have been developed to increase students' understanding and interest in science (Juniawan et al., 2023). The study by Dini and Rini (2024) indicates that learning media based on local potential can significantly enhance students' critical thinking and problem-solving skills. In addition, the integration of culture-based learning has been shown to foster 21st-century competencies such as critical thinking, collaboration, creativity, and problem-solving skills (Alwanda et al., 2024). The integration of local potential in science learning has been proven to strengthen the development of these competencies while also enhancing students' cultural awareness, making the learning not only academically relevant but also contextual and culturally meaningful (Kamila et al., 2024).

Therefore, it is important to conduct a literature review to identify and analyze research trends in this field. This review not only provides a general overview of research developments but can also serve as a foundation for designing learning innovations that are more relevant to both local and global needs.

Method

This study employed a Systematic Literature Review (SLR) approach using descriptive and analytical methods. Data were obtained from scholarly articles indexed in Google Scholar and Dimensions.ai within the time span of 2016 to 2024. Data collection was conducted using the Publish or Perish software and keyword-based article searches, using terms such as learning media, scientific literacy, and local wisdom.

The research procedure followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) framework, which includes the stages of identification, screening, eligibility, and inclusion of documents (Juniawan et al., 2023). The inclusion criteria encompassed articles discussing: (1) science learning media, (2) scientific literacy, and (3) the integration of local wisdom values in learning.

The data were analyzed using bibliometric analysis to examine publication trends, types of learning media used, and dominant keywords. Bibliometric analysis is not only capable of visually illustrating research trends, but also provides potential directions for future studies, particularly in the context of local wisdom-based learning (Muhammad et al., 2022). Keyword visualization and mapping within the articles were aided by VOSviewer software to capture the relationships among topics in the reviewed literature. Such bibliometric analysis allows researchers to visually map and evaluate publication patterns within a specific field of study (Donthu et al., 2021).

Results and Discussion

This study aims to describe research trends related to local wisdom-based media for improving scientific literacy, conducted from 2016 to 2025. Research documents on these trends were collected from the period between 2016 and 2025. Figure 1 below presents the trend of studies on local wisdom-based media for enhancing scientific literacy.

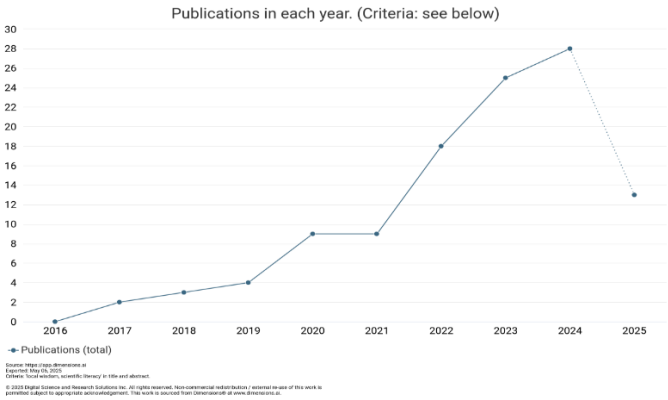

Figure 1. Research Trends on Local Wisdom-Based Learning Media to Improve Scientific Literac

Figure 1 shows that the research trend experienced both increases and decreases. From 2016 to 2019, the number of publications grew gradually. In 2020, there was a significant spike, followed by a steady increase through 2024. The growing trend of research in this area is linked to the demands of 21st-century education, where scientific literacy is considered crucial for developing students' critical thinking skills and competitiveness in the global era (Putri, 2020; Siregar et al., 2020).

In the early period, specifically in 2016, the number of publications was very low, with only one publication. However, this number increased

gradually, reaching four publications by 2019. A notable surge occurred in 2020 and 2021, with nine publications, and remained stable. The trend rose significantly in 2022 with 18 publications, continued to 25 in 2023, and peaked in 2024 with 28 publications. Interestingly, in 2025, the number of publications dropped to 13, which is likely due to incomplete data for 2025, as the data were exported in May 2025.

Overall, this graph reflects an increasing interest and attention among researchers toward the theme of local wisdom and scientific literacy in recent years. Below is Table 1, which presents research on local wisdom-based media for improving scientific literacy categorized by type of publication.

Table 1. Trends in Local Wisdom-Based Media for Improving Scientific Literacy by Type of Publication

Publication Type	Publication
Artikel	103
Buku	5
Prosiding	4
Monograf	1

Based on Table 1, it is known that research on media based on local wisdom aimed at improving scientific literacy from 2016 to 2025 is categorized into four types of publications. The table shows that the majority of scientific publications are in the form of journal articles, with a total of 103 publications. This number is highly dominant compared to other publication types, indicating that articles are the main medium for conveying research findings or scholarly studies. Furthermore, there are 5 publications in the form of books, suggesting a contribution from authors in producing more comprehensive and in-depth academic works. There are 4 proceedings publications, reflecting participation in academic activities such as seminars or conferences presented in paper form. Meanwhile, there is only 1 monograph publication, indicating that in-depth studies independently published by the author are still very limited.

An article is a factual composition of a certain length, written for publication in either online or printed media (such as journals, newspapers, magazines, bulletins, blogs, preprints, etc.) and aims to convey ideas and facts that can persuade, educate, and entertain (Herianto, 2020).

Table 2 presents ten (10) trending research titles related to local wisdom-based media aimed at enhancing scientific literacy, which are frequently referenced in related studies.

Table 2 shows that the most frequently published source on the trend of local wisdom-based media for improving scientific literacy is the Jurnal Penelitian Pendidikan IPA (Journal of Science Education Research). This journal includes 7 publications with 57 citations and an average of 8.14 citationsperarticle.

Table 2. Top 10 Source Titles in the Research Trend of Local Wisdom-Based Media to Improve Scientific Literacy in 2016–2025

Name	Publication	Citations	Average Citations
Journal of Science Education Research	7	57	8.14
Advances in Social Science, education and Humanities Research	6	1	0.17
Journal of Physics Conference Series	4	42	10.50
JPBI (Indonesian Journal of Biology Education	3	22	7.33
AIP Conference Proceedings	2	1	0.50
Internasional Journal of Evaluation and Research in Education	2	14	7.00
Journal of Educational Research and Developmen	2	11	5.50
Formatif: Scientific Journal of Mathematics and Science Education	2	8	4.00
Scientific Journal of Physics Education	2	1	0.50
Internasional Journal of Research and Review	2	0	-

The Journal of Science Education Research publishes scientific articles in the form of research results covering the fields of science, technology, and learning in natural sciences. All issues in this journal are open access, meaning that the published articles can be directly and permanently read, downloaded, copied, and freely distributed. Furthermore, Table 3 presents the top ten (10) trending article titles in research on the Problem Based Learning model to improve generic science skills in science learning, which are frequently cited by other researchers on this topic.

Table 3 shows that research on media based on local wisdom to improve science literacy that is most frequently cited by other researchers is the study entitled "Analysis of students' critical thinking skills in terms of gender using science teaching materials based on the 5E learning cycle integrated with local wisdom" with an average citation of 72.25 per year (Ramdani et al., 2021). Next, the study entitled "The urgency of local wisdom content in social studies learning: Literature review" is cited 55.00 times per year (Jumriani et al., 2021). The study by Dewi et al. (2021) entitled "The

effect of contextual collaborative learning based ethnoscience to increase student's scientific literacy ability" is also widely cited by other researchers, with 40.50 citations per year. Meanwhile, the research by Setiawan et al. (2017) entitled "The Development of Local Wisdom-Based Natural Science Module to Improve Science Literation of Students" received an average citation of 40.38 per year. The development of local wisdom-based e-modules is considered effective in improving both students' science literacy and reading literacy, as the materials presented are more contextual and meaningful (Setyorini et al., 2022).

Table 3. Top 10 Citations on Research Trends of Local Wisdom-Based Media to Improve Science Literacy in 2016–2025

Citations/year	Year	Author	Title
72.25	2021	Ramdani, A., Jufri, A. W., Gunawan, G., Fahrurrozi, M., & Yustiqvar, M	Analysis of students' critical thinking skills in terms of gender using science teaching materials based on the 5E learning cycle integrated with local wisdom
55.00	2021	Jumriani, J., Mutiani, M., Putra, M. A. H., Syaharuddin, S., & Abbas, E. W.	The urgency of local wisdom content in social studies learning: Literature review
40.50	2021	Dewi, C. C. A., Erna, M., Haris, I., & Kundera, I. N.	The effect of contextual collaborative learning based ethnoscience to ıncrease student's scientific literacy ability
40.38	2017	Setiawan, B., Innatesari, D. K., Sabtiawan, W. B., & Sudarmin, S.	The Development of Local Wisdom-Based Natural Science Module to Improve Science Literation of Students
28.60	2020	A Fadli	The Effect of Local Wisdom-Based Elsii Learning Model on the Problem Solving and Communication Skills of Pre-Service Islamic Teachers.
20.00	2024	Kamila, K., Wilujeng, I., Jumadi, J., & Ungirwalu, S. Y.	Analysis of Integrating Local Potential in Science Learning and its Effect on 21st Century Skills and Student Cultural Awareness: Literature Review
19.00	2021	Ridho, S., Wardani, S., & Saptono, S.	Development of local wisdom digital books to improve critical thinking skills through problem based learning
16.33	2022	Muhammad, U. A., Fuad, M., Ariyani, F., & Suyanto, E.	Bibliometric analysis of local wisdom-based learning: Direction for future history education research
5.00	2024	Tabun, Y. F.	Pengembangan Pembelajaran Ipa Berbasis Kearifan Lokal (Hamis Batar) Untuk Meningkatkan Literasi Sains Siswa (Studi Literatur)
2.33	2022	L Setyorini, S Haryani, E Susilaningsih	Development of e-module based on local wisdom to improve science literacy and reading literacy

The data from this study is comparable to the trend data on the increasing number of studies on wisdom-based media to enhance scientific literacy from 2016 to 2025. This indicates that during those years, research related to this topic continued to be cited by other researchers. In the articles examined and written by these researchers, there are many terms related to wisdom-based media for improving scientific literacy. Below are ten (10) popular keywords related to wisdom-based media for enhancing scientific literacy.

Based on Table 4, the term “ethnoscience” emerges as the most frequently appearing keyword in the research trends on local wisdom-based media for enhancing scientific literacy, with 31 occurrences, although its relevance score is only 0.85. In contrast, the keyword with the highest relevance is “community science”, with a relevance score of 2.04, despite appearing only 15 times. Other frequently occurring keywords include “character education” (29 times), “local wisdom values” (23 times), and “science education” (28 times), indicating that the development of scientific literacy based on local culture emphasizes not only cognitive aspects but also affective and contextual dimensions.

Table 4. Keywords in Research Trends on Local Wisdom-Based Media to Enhance Scientific Literacy from 2016 to 2025

Term	Occurrences	Relevance
Community Science	15	2.04
Scientific Literacy Skills	15	1.93
Local Knowledge	15	1.78
Science Education	28	1.52
E-Module	15	1.29
Local Wisdom Values	23	1.16
Digital Literacy	16	0.87
Ethnoscience	31	0.85
Character Education	29	0.78
Scientific Knowledge	15	0.52

The presence of terms such as "local knowledge" and "scientific literacy skills", which show high relevance scores (1.78 and 1.93 respectively), reinforces the notion that local approaches are a crucial foundation for improving students' scientific understanding. A study by Wibowo (2024) shows that chemistry learning based on ethnoscience can improve students' scientific literacy by connecting science material with local cultural practices. Similarly, Dal et al. (2023) highlight the importance of ethnoscience-based student worksheets (LKS) as relevant contextual media in science education. Nofiana and Julianto (2018) also emphasize that learning based on local excellence can be an effective strategy to enhance scientific literacy, as it helps students understand science in a more meaningful and contextually relevant way.

These studies demonstrate that the use of instructional media integrating local wisdom not only strengthens cultural values but is also effective in enhancing students' understanding of scientific concepts and overall scientific literacy. The following is a visual representation created through landscape mapping, illustrating the interrelated topics in the scientific studies. The bibliometric mapping result of the co-word network in articles related to the Problem-Based Learning model for enhancing generic science skills in science education is presented in Figure 2.

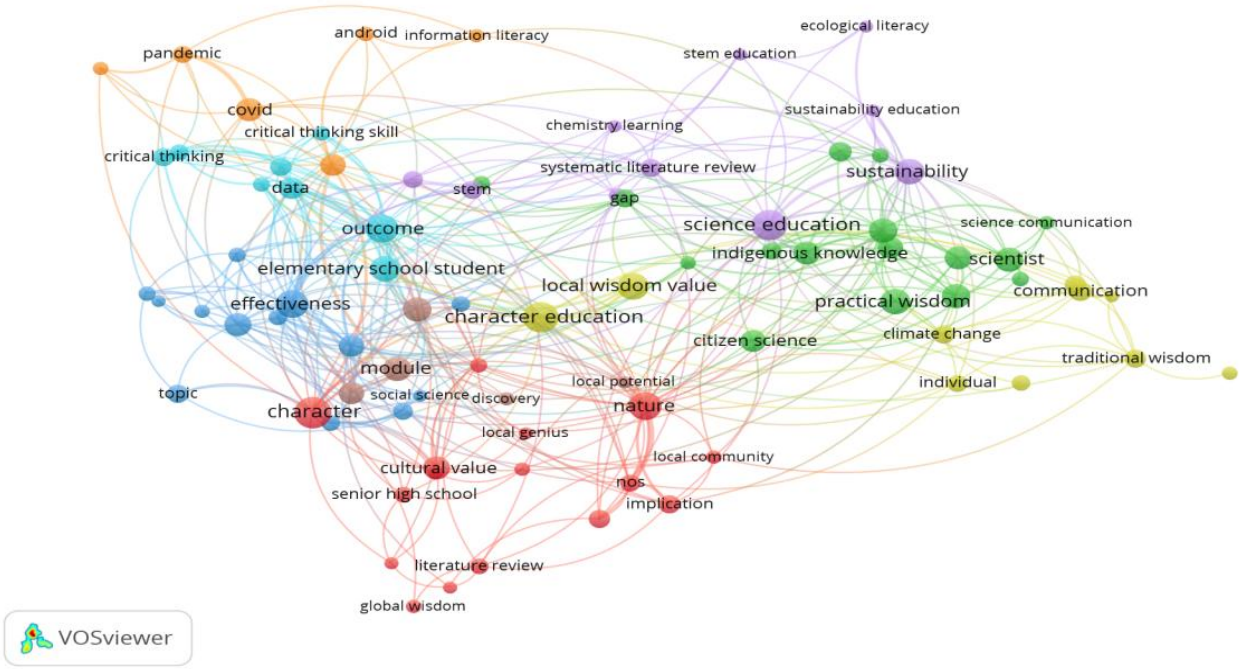

Figure 2. Network Visualization of Research Trends on Local Wisdom-Based Media to Enhance Scientific Literacy

Figure 2 illustrates the bibliometric mapping of keywords related to research trends on local wisdom-based media for enhancing scientific literacy. The visualization reveals several interconnected keywords that form five distinct clusters, each based on thematic proximity among the topics. The first cluster, marked in red, includes keywords such as nature, cultural value, local genius, local community, senior high school, character, and literature review. This cluster reflects a research focus on the relationship between local wisdom, cultural values, character development, and education at the senior high school level. The second cluster, shown in blue, consists of keywords such as effectiveness, elementary school student, module, topic, and outcome, highlighting research that emphasizes the implementation and effectiveness of module-based learning at the elementary school level. The third cluster, in green, comprises keywords such as science education, practical wisdom, indigenous knowledge, citizen science, and sustainability, which indicate a focus on science education that is integrated with local knowledge and sustainability issues. The fourth cluster, marked in purple, features keywords like chemistry learning, systematic literature review, STEM, and ecological literacy, reflecting connections between scientific literacy, STEM education, and environmentally based learning. The fifth cluster, in yellow, includes keywords such as communication, scientist, traditional wisdom, and climate change, pointing to discussions about the role of scientists and science communication in addressing global issues through the lens of local wisdom.

Figure 2 also shows that the network visualization displays the relationships between the visualized

terms. Keywords classified into five clusters are arranged in a colored graph that shows interconnected divisions. This analysis result can be used to determine research trends based on keywords over the past few years. The analysis reveals several frequently used keywords in research about media based on local wisdom to enhance science literacy. The more keywords appear, the broader the visualization display shown. Below is also presented the keywords related to media based on local wisdom for improving science literacy based on the overlay visualization.

Figure 3 shows the keyword trends related to research on local wisdom values in science learning in journals indexed by Google Scholar from 2019 to 2022. The theme development trend of the articles is illustrated through a color gradient starting from purple (2019), blue (2020), turquoise and green (2021), to yellow (2022). From this visualization, it can be seen that in 2019, keywords such as science education, practical wisdom, scientist, sustainability, ecological literacy, and NOS frequently appeared in the studies. Then, in 2020, keywords such as nature, local wisdom value, indigenous knowledge, and citizen science began to emerge. Meanwhile, from 2021 to 2022, the research trend shifted towards more applied themes such as effectiveness, module, critical thinking skill, elementary school student, character education, and data. This indicates that the research focus shifted from conceptual aspects towards the application of local wisdom in the development of students' character and criticalthinkingskills.

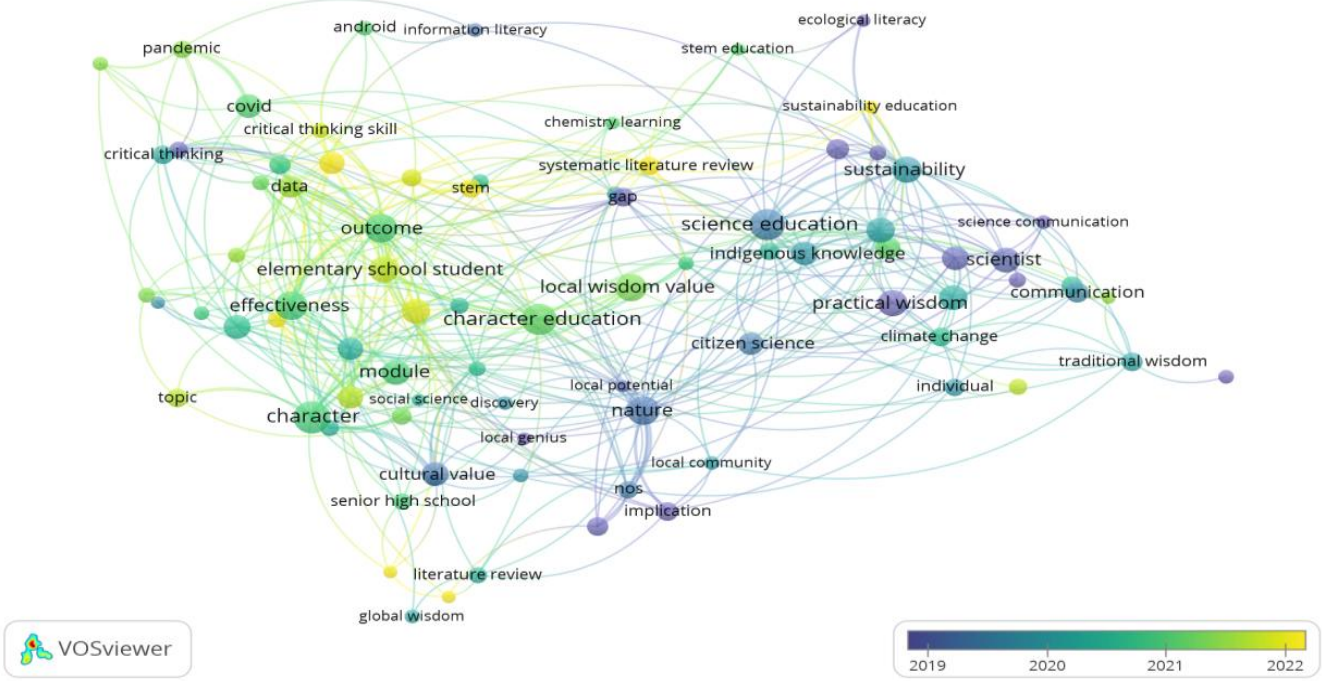

Figure 3. Overlay Visualization of Research Trends on Local Wisdom-Based Media to Enhance Science Literacy

Research on Local Wisdom-Based Media to Enhance Science Literacy is one of the rapidly developing fields in recent years. Below is also presented the keywords related to Local Wisdom-Based Media to Enhance Science Literacy based on density visualization. Figure 4 shows the density visualization. The density of research themes is marked by bright yellow color. The brighter the color of a theme, the more it has been researched. Conversely, the dimmer the color of a theme, the less it has been studied (Ulwiyah et al., 2024). Themes with dim colors such as "pandemic," "covid," "information literacy," "stem education," "ecological literacy," "global wisdom," "traditional wisdom," and "individual" are keywords with low color intensity or appear dull. This indicates that these topics are still rarely researched and can serve as references or opportunities for further research in the future. On the other hand, keywords such as "science education," "sustainability," "character education," "elementary school student," "local wisdom value," and "practical wisdom" appear in bright yellow, indicating that these topics are currently popular and widely studied in recent research. Bahtiar et al. (2023) stated that the yellow color represents keywords that are currently and frequently used in research.

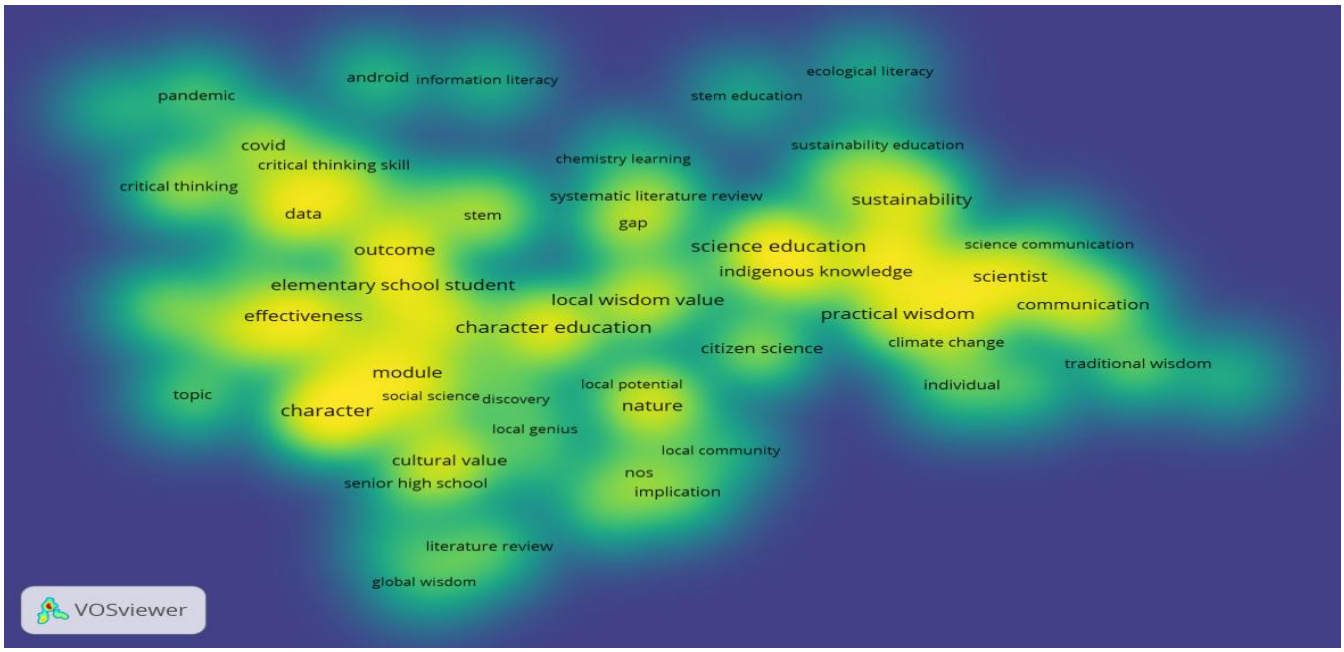

Figure 4. Density Visualization of Trends in Local Wisdom-Based Media to Enhance Science Literacy

Research on local wisdom-based media to enhance science literacy is very important because it supports 21st-century education. Media that incorporate elements of local wisdom can become learning tools that are closer to students' lives, thereby helping them better understand science. Science literacy is essential so that students can comprehend and use scientific information to solve everyday problems. This research trend is expected to continue growing, especially by integrating local culture, technology, and new teaching methods. Frequently appearing keywords in this research include Science Literacy, Learning Media, Local Wisdom, Contextual Learning, and Science (IPA).

Conclusion

Research on trends in local wisdom-based media to enhance science literacy has high urgency due to its potential to provide various benefits for 21st-century education. The research trend on local wisdom-based media to improve science literacy indexed in Google Scholar from 2016 to 2025 shows a fluctuating increase. Starting from 2016 to 2019, the number of publications gradually increased. In 2020, there was a significant surge, followed by a steady rise until 2024. There are many documents in the form of articles, books, proceedings, and monographs discussing research on science literacy. Frequently appearing keywords in this research include Science Literacy, Media

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Author Contributions
In the writing of this article, the first author was responsible for designing the writing structure, conducting the literature review, and preparing the final manuscript. The second author contributed to validating the methodology and analyzing the literature data using bibliometric tools. The third author was involved in the theoretical review and editing the content to ensure alignment with scientific principles and the focus on science education. The fourth author provided substantive input regarding keyword mapping and bibliometric data visualization using the VOSviewer software. All four authors collaboratively reviewed, edited, and approved the final manuscript for publication.

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Conflict of Interest
The authors declare no conflict of interest.

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