

Research Trends on Local Potential and Opportunities in Science Education: A Bibliometric Analysis Using VOSviewer

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Abstract

Local potential refers to everything a region possesses in various fields, such as natural environment, resource production, culture, society, and other areas. This study aims to conduct a bibliometric analysis by integrating mapping analysis using the VOSviewer program and data collection using the Publish or Perish application. The method used is a bibliometric and quantitative descriptive approach. Data was obtained by searching for the terms "local potential" and "education science" on Google Scholar using the Publish or Perish application, resulting in 560 articles published from 2013 to September 2023. Based on the research, there was an increase in publications during 2013-2017, starting from 3 articles in 2013, 5 in both 2014 and 2015, 10 in 2016, and 75 in 2017. In 2018, there was a decrease to 32 articles, but from 2019 to 2022, there was an increase again, with 69 articles published in 2019, 84 in 2020, 105 in 2021, and 106 in 2022. In 2023, there was a decline to 98 articles. Research on the topic of "local potential" in science education can still be explored further, particularly in under-researched aspects such as "assessment, discovery, ecosystem material, environment literacy, student worksheets (LKPD), local culture, medicinal plants, natural science education, science process skills, science web modules, student worksheets, videos, and wisdom."

Keywords: Local Potential; Science Education; Bibliometric Analysis; VOSviewer.

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1. Introduction

Local potential refers to resources, including natural resources, human resources, technological resources, and cultural resources that exist within a region and are developed to build national self-reliance. The diverse local potentials in Indonesia should encourage communities to develop and innovate based on these potentials. However, the application of local potential in education is still rarely integrated into school curricula. According to (Rokhmaniyah et al., 2020), the development of local potential is primarily focused on subjects like Arts, Culture, and Crafts. The integration of local potential in education can connect contextual learning with scientific concepts, enabling students to directly apply their findings to the environment (Budiarti et al., 2022).

Science education involves various activities between teachers and students to acquire knowledge, attitudes, or skills in line with the objectives set by the teacher. Science education differs from other subjects because it emphasizes products, attitudes, processes, and applications (Fatimah & Mufti, 2014). Therefore, careful planning of learning activities is necessary before implementing the lessons. The integration of local potential into science education is crucial to achieve the essence of science as a unified whole (Wilujeng et al., 2017). The successful application of local potential requires substantial support and alignment with the appropriate subject matter (Lestari & Rosana, 2020).

The application of local potential in various educational settings presents an opportunity for researchers to increase the number of research articles on specific topics. Bibliometric analysis can be used to estimate the scope or potential areas for research on particular topics related to local potential. To use the bibliometric method, software such as VOSviewer is needed to visualize or create maps based on the data obtained. The bibliometric approach helps gain a deeper understanding of the intellectual structure and research dynamics (Wang & Kim, 2023). Additionally,

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bibliometric analysis not only reviews existing research data but can also identify future research domains (Hou & Yu, 2023).

The purpose of this study is to describe the development of research related to local potential in science education, viewed from the distribution of bibliometric maps and research trends based on Google Scholar data using VOSviewer software. The bibliometric results include the growth in the number of studies on local potential in science education, the interconnected aspects of local potential in education, and aspects that are still under-researched in the context of local potential in science education.

2. Method

In this study, the data used is based on research articles published in Google Scholar. To obtain research data, a reference management program was used. The application used to manage this research is Publish or Perish. Each item was reviewed in this study, and only publications related to local potential in science education were included. The authors used the keywords "local potential" and "education science" in topics, keywords, and abstract criteria to obtain statistical results on Publish or Perish. A total of 1000 articles were initially retrieved using this application, but a further selection process reduced the number to 560 articles relevant to the subject matter. The articles used for this research were published from 2013 to September 1, 2023. After that, the collected data items were saved in *.ris format, and the VOSviewer tool was used to visualize and analyze trends related to local potential. The researchers created a data mapping article sourced from the prepared database. There are three forms of data mapping: network, density, and overlay visualization.

3. Results and Discussion

3.1. Development of Research on Local Potential in Science Education

The researchers collected data for this study using the Publish or Perish program. This program gathers data from Google Scholar publications. The researchers used the keywords "local potential" and "education science" within the time range of 2013-2023. The search resulted in 560 articles relevant to the subject. Figure 1 shows the development of research related to the theme of "local potential."

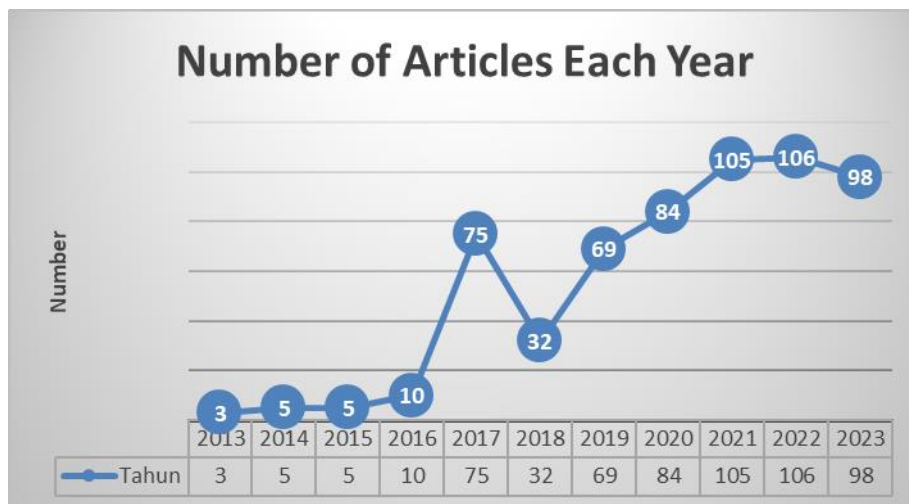


Figure 1. Development of the Number of Articles on Local Potential in Science Learning

Figure 1 illustrates the growth in the number of articles published on Google Scholar related to "local potential" from 2013 to 2023, peaking in 2021 with 105 articles and in 2022 with 106 articles. However, the number of articles in 2023 has decreased to 98, which may be due to the fact that the year 2023 is not yet over. The data was obtained using the Publish or Perish technique, resulting in 1,000 entries, which were subsequently checked, yielding a total of 560 articles, with 2,452 citations, an average of 245.20 citations per year, 4.38 citations per paper, an h-index of 24, and a

g-index of 40. The researcher then filtered this data to identify the top twenty publications with the highest citations from various journals.

Table 1. Data on Journals in the Field of Local Potential in Science Learning

No	Authors	Title	Year
1	(Setiawan et al., 2017)	The Development of Local Wisdom-Based Natural Science Module to Improve Science Literation of Students	2017
2	(I. N. Dewi et al., 2017)	ELSII learning model based local wisdom to improve students' Problem solving skills and scientific communication	2017
3	(C. A. Dewi et al., 2019)	An Ethnoscience Study in Chemistry Learning to Develop Scientific Literacy	2019
4	(Nadia et al., 2023)	Identification of The Process for Establishing Tourism Awareness Group (Pokdarwis) Kampung Banjar	2023
5	(Selasih & Sudarsana, 2018)	Education based on ethnopedagogy in maintaining and conserving the local wisdom: A literature study	2018
6	(Fahmi et al., 2021)	Feasibility of the Prototype of Teaching Materials on the Topic of Classification of Living Things Based on the Advantage of Local Wetland	2021
7	(Ramdiah et al., 2020)	South Kalimantan Local Wisdom-Based Biology Learning Model	2020
8	(Subali et al., 2015)	Developing Local Wisdom Based Science Learning Design to Establish Positive Character in Elementary School	2015
9	(Musyiam, 2018)	Model of Civic Education Learning Based on The Local Wisdom for Revitalizing Values of Pancasila	2018
10	(Sumarni et al., 2016)	The Reconstruction of Society Indigenous Science into Scientific Knowledge in the Production Process of Palm Sugar Woro	2016
11	(I. P. M. Dewi et al., 2017)	The Effect of Science Learning Integrated with Local Potential of Wood Carving and Pottery Towards the Junior High School Students' Critical Thinking Skills	2017
12	(Abidinsyah et al., 2019)	The Implementation of Local Wisdom-Based Learning and HOTS-Based Assessment: Teacher Survey in Banjarmasin	2019
13	(Hasanah et al., 2016)	Pengembangan Modul Mitigasi Bencana Berbasis Potensi Lokal yang Terintegrasi dalam Pelajaran IPA di SMP	2016
14	(Hastuti et al., 2020)	How to develop students' scientific literacy through integration of local wisdom in Yogyakarta on science learning?	2020
15	(Hayati et al., 2019)	Pengembangan modul potensi lokal berbasis SETS untuk meningkatkan keterampilan proses IPA	2019
16	(Rahmawati et al., 2019)	The Effect of Ethnoscience Based Contextual Learning Toward Students' Learning Activity	2019
17	(Hairida, 2017)	Using Learning Science, Environment, Technology and Society (SETS) Local Wisdom and based Colloids Teaching Material	2017
18	(Sunarsih et al., 2020)	The Development of Biodiversity Module Using Discovery Learning Based on Local Potential of Wonosobo	2020
19	(Putri & Aznam, 2019)	The Effect of the Science Web Module Integrated on Batik's Local Potential towards Students' Critical Thinking and Problem Solving (Thinking Skill)	2019
20	(Zukmadini et al., 2018)	Developing antimicrobial medicinal plants pocketbook based on local wisdom of Muko-Muko and Serawai ethnics	2018

Table 1 shows data obtained from 20 articles relevant to the related topic. These 20 articles are those with the highest citations. Based on Table 1, the highest citation is 222, and the lowest is 26. According to Table 1, there were no articles with the highest citations in 2013, 2014, and 2022 based on data obtained from Publish or Perish. In 2015, there was 1 article with 64 citations, which is the lowest among the 20 articles; in 2016, there were 2 articles with 99 citations; in 2017, there were 4 articles with the highest total citations of 409; in 2018, there were 2 articles with a total of 101 citations; in 2019, there were 5 articles with a total of 240 citations; in 2020, there were 3 articles with a total of 136 citations; in 2021, there was 1 article with 71 citations; and in 2023, there was 1 article with 85 citations.

3.1. Visualization of Local Potential in Science Learning Using VOSviewer

This research focuses on local potential in science learning, and mapping using VOSviewer can be seen in Figure 2.

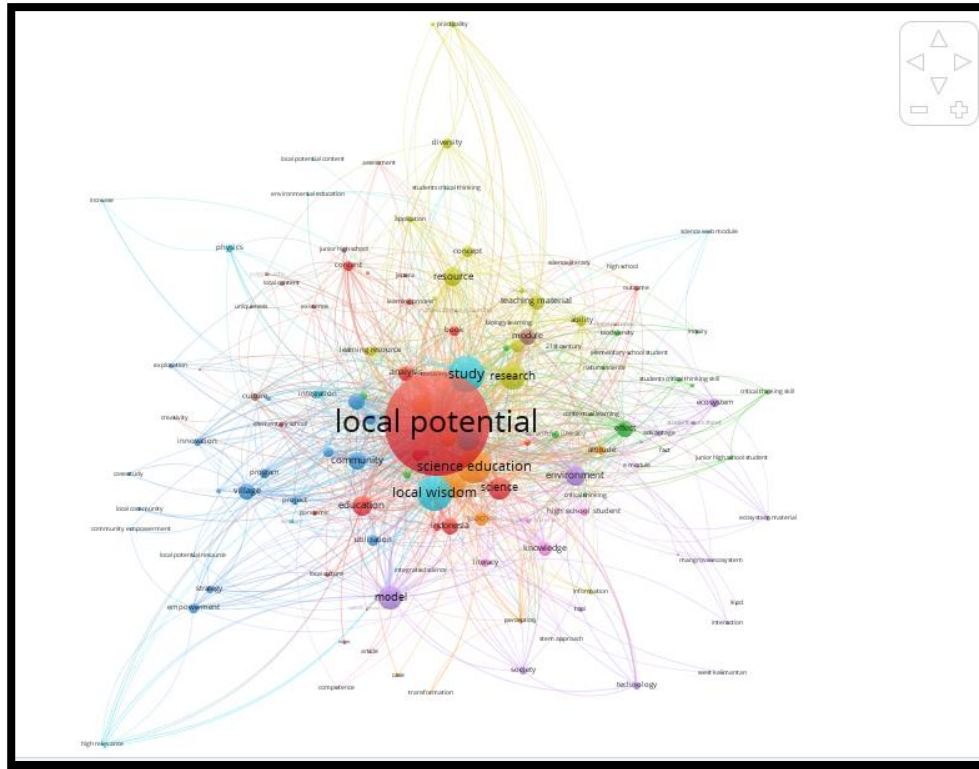


Figure 2. All Clusters from Bibliometric Results

Based on image 2, the findings from all clusters are presented. A total of 10 clusters were identified related to the keyword "local potential." There are 134 items divided among these 10 clusters.

- Cluster 1 consists of 23 items: analysis, article, book, character, content, education elementary school, elementary school student, existence, government, Indonesia, Jepara, journal, learning process, local culture, local potency, local potential, outcome, pandemic, potential, science, specific resource, video.
- Cluster 2 includes 19 items: 21st century, biodiversity, contextual learning, critical thinking, critical thinking skills, effect, ethnoscience, fact, impact, improvement, inquiry, junior high school student, natural science, natural science education, nature, science process skills, scientific literacy, students' critical thinking, understanding.
- Cluster 3 comprises 18 items: activity, approach, case study, community, community empowerment, empowerment, entrepreneurship, exploration, identification, implementation, innovation, local community, local potential resource, program, project, strategy, utilization, village.
- Cluster 4 has 17 items: ability, application, biology, biology learning, concept, diversity, high school, information, learning resource, popular scientific book, practicality, research, resource, senior high school, solution, teaching, teaching material.
- Cluster 5 contains 14 items: advantage, ecosystem, ecosystem material, environment, importance, interaction, LKPD (student worksheet), mangrove ecosystem, model, society, student worksheet, technology, tool, West Kalimantan.

- Cluster 6 includes 13 items: environmental education, high relevance, increase, integration, life skills, local potential content, local wisdom, physics, science web module, skill, students' critical thinking, study, wisdom.
- Cluster 7 consists of 12 items: attitude, case, discovery, experience, integrated science, learning, perception, problem, science education, science learning, teacher, transformation.
- Cluster 8 contains 9 items: creativity, culture, junior high school, local content, local knowledge, medicinal plant, module, uniqueness, Yogyakarta.
- Cluster 9 comprises 7 items: competence, e-module, environmental literacy, high school student, knowledge, literacy, STEM approach.
- Cluster 10 consists of 2 items: assessment and science literacy.

Based on image 2, the links most strongly related to local potential are science education, local wisdom, and study. Meanwhile, the links that are less strongly related include integrated science, local potential content, LKPD (student worksheet), video, STEM approach, and others. Links that are unrelated are scattered across the 10 clusters and are marked by small circles. The small circles represent areas that have not yet been extensively researched and have the potential for new research opportunities.

3.2. Overlay Visualization of Local Potential

This visualization technique is an innovation in local potential within science education and covers the time span from 2013 to 2023 (see Figure 4).

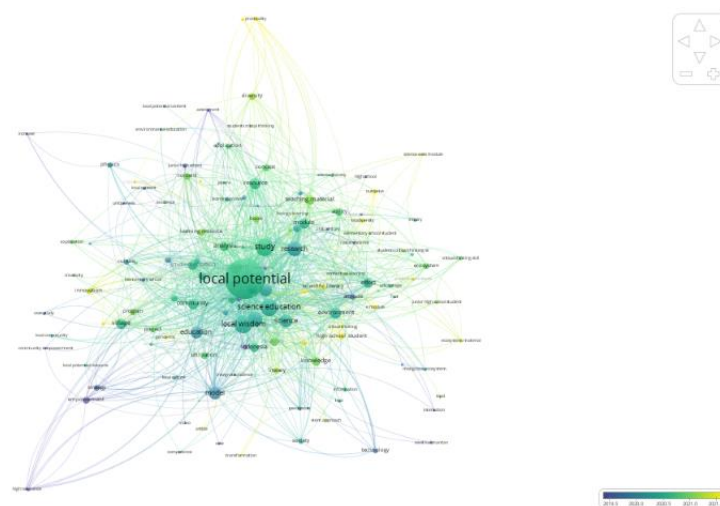


Figure 4. Overlay Visualization of Local Potential

Figure 4 shows that items colored dark blue indicate research conducted before 2019, while the colors gradually lighten to yellow, indicating research conducted more recently, particularly close to 2021. Examples of some aspects researched recently in 2021 include scientific literacy, outcome, innovation, e-module, and student worksheet.

3.3. Visualization of Local Potential Density Using VOSviewer

The final mapping is represented by density visualization, as shown in Figure 5, with the keyword "local potential." This type of mapping is grouped based on the number of studies. In this visualization, the color of the terms is significant. If the color of a term becomes lighter, it indicates that the research is frequently studied, while a darker color suggests that the topic is less commonly researched (Hayati et al., 2023).

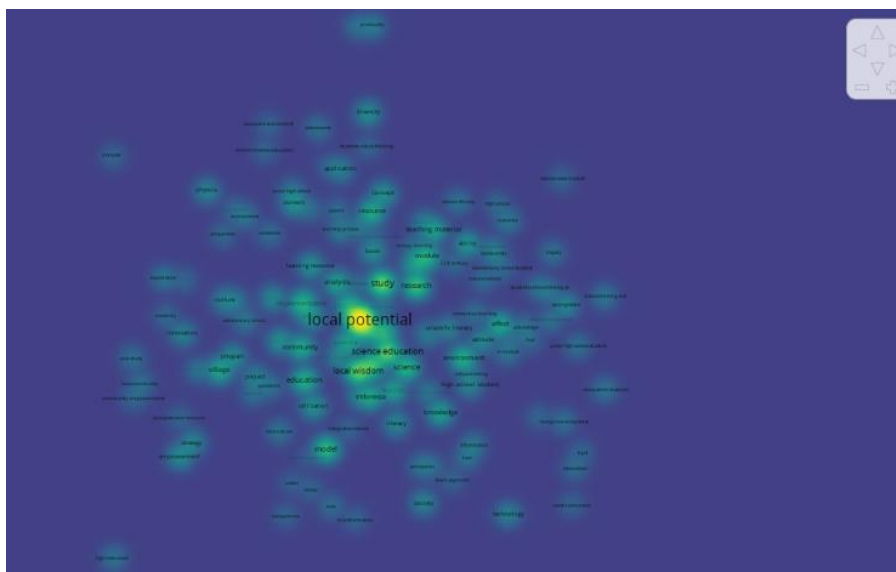


Figure 5. Density Visualization with the Keyword "Local Potential"

Future research opportunities related to the novelty aspects of the local potential topic can be seen in Figure 5. The density visualization based on the keywords used highlights areas of research that are still rarely explored. Based on the interpretation and research topic opportunities in Figure 5, the areas that are very dim, such as “assessment, discovery, ecosystem material, environmental literacy, LKPD (student worksheet), local culture, medicinal plant, natural science education, science process skills, science web module, student worksheet, video, and wisdom,” indicate significant potential for integration into science education.

4. Conclusion

The conclusion of this research discusses the literature analysis of local potential. This study used the keyword "local potential." Based on the data obtained with this keyword, 560 articles were identified. The research highlights emerging trends in local potential within science education. According to the findings, there was the highest increase in research over three years from 2020 to 2022, and it is possible that the number of studies may increase even further in 2023 compared to 2022. This data can serve as a research resource for educators or other researchers interested in exploring the application of local potential in science education. Areas of local potential that are still rarely studied include “assessment, discovery, ecosystem material, environmental literacy, LKPD (student worksheet), local culture, medicinal plant, natural science education, science process skills, science web module, student worksheet, video, and wisdom.

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