Bibliometric analysis of local wisdom-based learning: Direction for future history education research

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Article Info

ABSTRACT

The various cultures that have entered Indonesia country make national identity and character must be strengthened by involving local wisdom in the learning activity. This study provided the bibliometric and bibliographic review of many qualified literatures about local wisdom-based learning. A bibliometric analysis was employed to conduct this study supported by some software such as VOSviewer and Publish or Perish (PoP). There were 173 documents from Scopus database published in 2012–2021 involved in this study. Results revealed that publication trends on local wisdom-based learning increased slightly from 2012 to 2020, while the development of number of citations tended to be fluctuated in the period of 2012–2021. In addition, the influential papers about local wisdom-based learning were published by most of Indonesian researchers. The trending research on local wisdom-based learning was the development of local wisdom-based teaching materials in science or physics learning to educate Indonesian elementary students' character in which ethno-medicine-based science learning was the newly trending research. This study provides information for researchers in history education that studies related to the development of local wisdom-based historical teaching materials and the use of these teaching materials in the implementation of history learning seem like not much have been conducted in which it is expected to reinforce students' national identity and character.

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1. INTRODUCTION

Character education is one of the important issues that become a concern of the Indonesian government [1]. The social change has affected to the change of students' character. Hidayati *et al*. [2], revealed that a number of Indonesian students have problems related to their behavior. Many of them also have negative attitude and moral. As a consequence, Indonesian government proposes the character education to be implemented in learning process. So, the improvement of negative attitude, moral, and behavior is very urgent to be carried out soon by the character education.

In addition, the fast development of technology in the 21th century has brought to the change of Indonesian culture, especially on the teenagers such as students [3], [4]. The sophistication of technology has brought to the foreign culture to come in Indonesia. By their gadget such as hand phone or laptop, students can access other cultures in outside of Indonesia such as Korean culture and Western culture [5], [6]. These

cultures have changed students' style and behavior in the practice of daily life in which this style and behavior can fade of Indonesian ideology because the appearance of these foreign culture is not suitable with the identity of Indonesia nation.

Many foreign cultures that have entered not only can weaken the national identity but also these can make students to be a lazier in studying. Wibowo, Wulandari, and Setiawan [7], revealed that most of students are lazy to study and know related to something beneficial knowledge such as historical values. As a consequence, they do not understand and aware about their historical nation [8], [9]. This indicates that students' ability to understand the historical values is still low. It means that students' historical awareness, specifically about Indonesian history and culture should be enhanced. Therefore, the involvement of local wisdom in learning process is really important as one of the solutions to repair the negative attitude, moral and behavior of students. Also, local wisdom-based history learning is expected to be a way to enhance students' historical awareness by understanding the historical values.

Local wisdom is a cultural product consisting of habits, norms, rituals, ethics, beliefs, values, customs, and philosophy [10]. In detail, local wisdom consists of material and non-material. As a material, it is such as traditional clothing, craft arts, and traditional house. Meanwhile, as non-material, local wisdom can be defined as philosophy value. This indicates that it is mostly related to social studies. Seefeld, Castle, and Falconer [11] stated that the concept of social studies delivers a different culture, value, idea, and belief to teach people, especially children about value and attitude. This means that local wisdom is very possible to be a source of value to create students as the individuals who have a good attitude and behavior. In addition, it can be a source of material to enhance students' historical awareness so that they can understand the historical values.

Most of researchers have carried out research about local wisdom-based learning [2], [10], [12]–[26]. A number of researchers have studied related to development of teaching materials such as module and text book for natural science learning, such as physics learning [18], [23], biology learning [15], [21], [24], chemistry learning [20], [25], and mathematics learning [17], [26]. A few of researchers also have studied regarding the implementation of learning process based on local wisdom in the social studies [14], [16], [12], [19]. In addition, some researchers have studied about the implementation of local wisdom-based character education to build students' character as the individuals who have positive attitude and behavior [2], [27]. From the numerous studies about local wisdom-based learning, study related to history learning based on local wisdom seems that it is still minimal. Therefore, a review that can view the development of studies about local wisdom-based learning and map the scope of local wisdom-based learning should be conducted to make sure that the studies related to local wisdom-based history learning are really rare.

A bibliometric analysis, a method summarizing the large quantities of bibliometric data to present the state of the intellectual structure and emerging trends of research topic or field [28], is able to provide the mapping related to the scope of studies about local wisdom-based learning and view the development of studies about local wisdom-based learning. This indicates that bibliometric analysis is suitable to make sure whether studies about local wisdom-based history learning are actually rare when the scope of review is broad and the dataset is too large. To date, some reviewing studies about local wisdom-based learning have been conducted by using bibliometric analysis [29]–[31]. However, these studies focus on local wisdom-based physics learning [29], [31], and zoology based on local wisdom [30]. Meanwhile, the study related to local wisdom-based history learning by using bibliometric analysis seems like it has not been carried out. Therefore, this current study aims to provide extensive bibliometric and bibliographic review of numerous literatures related to local wisdom-based learning. The product of bibliometric and mapping analysis is expected to fill in the research gap by mapping the scope of studies about local wisdom-based learning and viewing the development of studies about local wisdom-based learning.

2. RESEARCH METHOD

A bibliometric analysis was employed to conduct this study [28], [32], [33]. Donthu *et al.* [28], stated that bibliometric analysis had some functions that were to: i) Position their intended contribution to the field; ii) Derive novel ideas for investigation; iii) Identify knowledge gaps; and iv) Gain a one-stop over view. A few of literatures stated that there were five steps to carry out bibliometric analysis [34], [35]. These steps are presented in Figure 1. The steps related to this bibliometric analysis were explained in subsection.
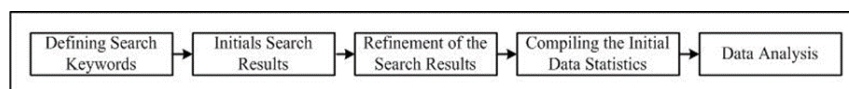

Figure 1. The steps of bibliometric analysis

2.1. Defining search keywords

The keywords "Local wisdom-based learning" was used to search literature which carried out in November 2021. The process of literature searches employed Scopus database because the database had a number of literatures with the good quality. In beginning, by selecting the document part, the keywords were written in the sub-part of documents that was search documents. The format "article title, abstract, keywords" in the Scopus database was selected to found more literature.

2.2. Initial search results

The results of initial search were found 273 documents published in the period of 1992–2021. The types of the documents were such as journal paper, conference paper, book chapter, review, conference review, and book which were written in language of English and Thai. These documents were compiled from the Scopus database by using research information systems (RIS) format. Hudha *et al.* [36], revealed that RIS format included some important information of document such as citation information (author, document title, year, source title, document type, and citation count), bibliographical information (affiliation, serial identifiers, and publisher), and abstract and keywords (abstract, author keywords, and index keywords).

2.3. Refinement of the search results

There were three inclusion criteria established to select the documents so that the documents which were suitable to the keywords "local wisdom-based learning" were obtained. The inclusion criteria were: i) The document was published in the period of 2012–2021 because we only studied these topics in the last one decade; ii) The document was written in English language because the most documents in the Scopus database were written in English and we only understood English as an international language; and iii) The document was journal paper or conference paper because many empirical studies were published in these document types. Table 1 shows the selection process of documents that were not suitable to the inclusion criteria. There were 175 documents obtained to be extracted in the initial data statistics. The comparison between initial search and refinement search is shown in Table 2. Some metrics data such as publication years, number of documents, citation, cities/year, cities/paper, authors/paper, h-Index, g-Index, hI-norm, hI-annual, and hA-Index were obtained from Publish or Perish (PoP) software in which the data in RIS format was imported to the PoP software [35].

Table 1. The selection process of documents

Search screening	Number of documents	The total of remaining document (n=273)
Not in English such as Thai	1	272
Not in the period of 2012–2021	22	250
Not in type of journal paper or conference paper such as book chapter, conference review, book, and review	10	240
Not relevant (there are not term "local wisdom" in the document title)	51	189
Not-learning topics	16	173

Table 2. Comparison metrics

Metrics data	Initial search	Refinement search
Query data	29/11/2021	29/11/2021
Keywords	Local wisdom-based learning	Local wisdom-based learning
Database	Scopus	Scopus
Languages	English and Thai	English
Document types	Journal paper, conference paper, book chapter, conference review, book, and review	Journal paper and conference paper
Publication years	30 years: (1992–2021)	10 years (2012–2021)
Number of documents	273	173
Citations	1.219	457
Cities/Year	42.03	50.78
Cities/Paper	4.47	2.64
Authors/Paper	3.18	3.43
h-Index	16	11
g-Index	28	15
hI-norm	11	6
hI-annual	0.38	0.67
hA-Index	7	6

2.4. Compiling the initial data statistics

In the PoP software, the data compiled in the RIS format could provide the initial data statistics such as publication year, document type, publisher, and publication [34], [35]. In addition, the compiled data in the PoP software could provide the summary of descriptive analysis such as total publication (TP), total citation (TC), number of citations per year (NCY), number of citations per publication (NCP), number of authors per publication (NAP), h-Index, g-Index and m-Index [36]. In detail, h-Index was calculated as h number of publications with at least h citation, while g-index indicated the g-number of highly cited papers with at least g2 citations, and m-index was measured as $\frac{h}{g}$ [37].

2.5. Data analysis

This study employed performance analysis and science mapping to analyze the data [28], [33], [34], [37]. Donthu *et al*. [28] stated that performance analysis examined the contribution of research constituent on the given field, while science mapping analysis examined the relationships among research constituent. Performance analysis using the PoP software was carried out to provide some analyses such as descriptive analysis, publication and citation trend analysis, author analysis, publisher-wise analysis, and journal-wise analysis [28]. On the other hand, science mappings used in this study were citation analysis, co-occurrence analysis, and co-authorship analysis. To enrich the science mapping, network analysis was conducted by using clustering and visualization [28]. Hierarchical clustering was employed to analyze clustering, while visualization analysis used network visualization, overlay visualization, and density visualization [33], [35]. Science mapping and network analysis were conducted by using the VOSviewer software [38].

3.   RESULTS AND DISCUSSION
3.1. Performances analysis
3.1.1. Descriptive analysis

Initially, 173 documents were established to be analyzed in this study. The descriptive analysis of the documents is presented in Table 3. The table shows that there were 173 papers about local wisdom-based learning which had been published in the period of 2012–2021 where the total citation of all papers was 457 times. In addition, the average citation per year was stated to be 50.78. It means that the papers in the journal or conference proceeding are cited on the average of nearly 51 times in every year. Also, the average citation per paper was stated to be 2.64. It shows that every paper is cited on the average of nearly three times. The ratio value of authors per paper was stated to be 3.43. It indicates that every paper in the journal or conference proceeding is written by the average of nearly four authors. Furthermore, the h-index of the collection of documents was 11. It indicates that there are 11 papers with at least 11 citations. Meanwhile, the g-index of the collection of documents was 15. It indicates that there are 15 highly cited papers with at least 225 citations. As a consequence, the m-index of the collection of documents was stated to be 0.73 and the ratio between h-index and g-index is 11:15. It indicates that g-index is always greater than h-index [37].

Table 3. Summary of descriptive analysis

Description	Results
Period	2012-2021
Total publication	173
Total citation	457
Authors	594
Average citations per year	50.78
Average citations per paper	2.64
Authors per paper	3.43
h-Index	11
g-Index	15
m-Index	0.73

The documents consisted of 74 (42.78%) journal papers and 99 (57.22%) conference papers. The documents in conference paper were more dominant than the documents in journal article. It indicates that researchers are more interesting to publish their paper in the conference proceedings than in the journal articles. Some bibliometric analysis studies also showed that the number of documents in conference paper were more than the number of documents in journal paper [29], [30].

3.1.2. Publication and citation trend analysis

The trend of publication and citation of the documents from year to year in the period of 2012–2021 is presented in Figure 2. It shows that the development of publication slightly increased in the period of 2012–2020. However, the development of publication in the period of 2020-2021 slightly decreased in which there was a reduction of the total publication about 30 documents. In detail, there were three papers published in 2012 and only one paper was published in 2013, followed by two papers each in the period of 2014–2015. In 2016, only three papers were published. The past three years had shown the increase of the productive publication with 15 papers in 2017, 20 papers in 2018, and 39 papers in 2019. There were 59 papers published in 2020 in which these papers consisted of 13 journal papers and 46 conference papers. Also, the number of publications in 2020 were more than the number of publications in other years. In 2021 until November, 29 papers were published.
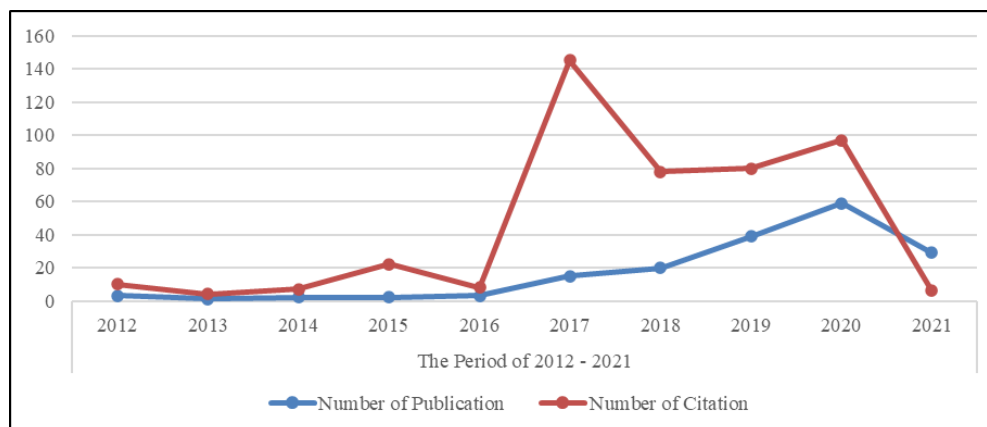

Figure 2. Publication and citation trend in Scopus database (data search on November 29, 2021)

On the other hand, the development of citation on the papers related to local wisdom-based learning tended to be fluctuated. In the period of 2016–2017, there was a sharp increase of total citation about 137 citations. Meanwhile, the number of citations sharply decreased in the period of 2017–2018 about 67 citations and in the period of 2020–2021 about 91 citations. In detail, there were ten citations in 2012 and four citations in 2013, followed by seven citations in 2014, 22 citations in 2015, and eight citations in 2016. The four past years had presented that there was a productive citation with 145 citations in 2017, 78 citations in 2018, 80 citations in 2019, and 97 citations in 2020. In 2021 until November, there were six citations.

3.1.3. Author analysis

Author analysis identified that there were three authors with the top contribution on the study about local wisdom-based learning as shown in Table 4. It shows that Kuswanto was the most productive author publishing seven papers about local wisdom-based learning in which every its paper was cited by on the average of nearly three times. In detail, he carried out some researchers joining with other authors related to development of local wisdom-based physics comic media [39], [40], local wisdom-based CAKA media for improving mathematical representation and critical thinking skills [26], and local wisdom-based mobile science learning [41], [42]. Meanwhile, Widiaty was the most influential author publishing six papers in which every its paper was cited by on the average of nearly four times. The paper with the title "Mobile-based augmented reality for learning 3-dimensional spatial batik-based objects" was the most influential paper that she written and published with other authors [43].

Table 4. Top three authors based on the contribution and citation

Author	Total publication	Total citation	Citation per publication	Affiliation	Total link strength
Kuswanto	7	15	2.14	Yogyakarta State University	17
Widiaty	6	19	3.17	Indonesia University of Education	26
Sudarmin	4	17	4.25	Semarang State University	13

3.1.4. Publisher-wise analysis

Publisher-wise analysis is presented in Table 5. The most productive publisher publishing the documents about local wisdom-based learning was found to be Institute of Physics Publishing in terms of both total citation and total publication. There were three influential papers with nine citations written by Irfan et al. [44], Mastuang et al. [45], and Ningrum et al. [46]. The difference of total citation between Institute of Physics Publishing and Semarang State University was relatively scanty about nine citations. However, the difference of total publication between Institute of Physics Publishing and Semarang State University was so far about 49 papers. As a consequence, every paper published by Institute of Physics Publishing was cited by on the average of nearly two times, while every paper published by Semarang State University was cited by on the average of nearly 12 times. In addition, the ratio between total citation and total publication of American Institute of Physics Inc was 24:3. It indicates that every paper published by the publisher was cited by on the average of nearly three times. Also, the contribution of each Eskisehir Osmangazi University and Taylor's University was relatively scanty about four papers. In contrast, the total citation of Eskisehir Osmangazi University was more than the total citation of Taylor's University so that every paper published by Eskisehir Osmangazi University was cited by on the average of nearly six times, while every paper published by Taylor's University was cited by on the average of nearly four times.

Table 5. Top five publisher based on contribution and citation

Publisher	Total citation	Total publication	TC/TP
Institute of Physics Publishing	109	58	1.88
Semarang State University	100	9	11.11
American Institute of Physics	24	8	3.00
Eskisehir Osmangazi University	22	4	5.50
Taylor's University	15	4	3.75

3.1.5. Journal-wise analysis

The top 5 journals based on total publication and total citation are presented in Table 6. The most familiar journal selected by the authors to publish their paper about local wisdom-based learning was Indonesian Journal of Science Education in which every paper published in this journal was cited by on the average of nearly 13 times. There were four influential papers published by Indonesian Journal of Science Education, namely the paper written by Setiawan et al. [47] with 36 citations, followed by Lestari, Dwijanto, and Hendikawati [48] with 27 citations, Hartini et al. [49] with 17 citations, and Atmojo [50] with 13 citations. Some journals such as International Journal of Instruction, European Journal of Educational Research, Indonesian Journal of Applied Linguistic, and International Journal of Innovation, Creativity, and Change published the papers with the total publication that was relatively scanty. Every paper in International Journal of Instruction was cited by on the average of nearly eight times, followed by six citations per paper in European Journal of Educational Research, five citations per paper in Indonesian Journal of Applied Linguistic, and three citations per paper in International Journal of Innovation, Creativity, and Change.

Table 6. Top 5 journals based on total publication and total citation

Journal	Total citation	Total publication	TC/TP
Indonesian Journal of Science Education	100	8	12.50
International Journal of Instruction	22	3	7.33
European Journal of Educational Research	17	3	5.67
Indonesian Journal of Applied Linguistic	10	2	5.00
International Journal of Innovation, Creativity, and Change	5	2	2.50

3.2. Science mapping and network analysis
3.2.1. Citation analysis

Citation analysis provides the information about the most influential publications related to local wisdom-based learning [28]. The most influential publications in this study were seen from the h-index. Table 3 shows that h-index of the collection of documents was 11 so that there were 11 papers which had the highest citation score until November 2021 as shown in Table 7. The table shows that the paper written by Setiawan et al. [47] was the most influential paper in which this paper was cited 36 times by other papers. This paper also was published in 2017. It means that in the period of 2017–2021, this paper was cited by on the average of nearly eight times in every year. In addition, every author of each paper affiliated in Indonesia. It indicates that the influential papers about local wisdom-based learning have been published by most of

Indonesian researchers. From top 11 cited papers, there were ten journal papers written by several researchers [10], [47]–[54], followed by one conference paper written by Hartini *et al*. [55]. Every journal paper was cited by on the average of nearly 17 times, while every conference paper was cited 11 times. It shows that regarding local wisdom-based learning, journal paper is more influential than conference paper. Also, from these papers, there were four papers published in Indonesian Journal of Science Education in which the total citation of these papers was 93 times. It means that every paper of these was cited by on the average of nearly 24 times. It interprets that as a publisher, Semarang State University presents the most influential publication about local wisdom-based learning.

Table 7. Top 11 publications with the highest citation score

Total citation	Author(s)	Publication title	Journal or conference	Publisher	Publication year
36	Setiawan, Innatesari, Sabtiawan, and Sudarmin	The development of local wisdom-based natural science module to improve science literation of students	Indonesian Journal of Science Education	Semarang State University	2017
27	Dwianto, Wilujeng, Prasetyo, and Suryadarma	The development of science domain-based learning tool which is integrated with local wisdom to improve science process skill and scientific skill and scientific attitude	Indonesian Journal of Science Education	Semarang State University	2017
17	Hartini, Firdausi, Misbah, and Sulaeman	The development of physics teaching materials based on local wisdom to train Saraba Kawa characters	Indonesian Journal of Science Education	Semarang State University	2018
17	Khusniati, Parmin, and Sudarmin	Local wisdom-based science learning model through reconstruction of indigenous science to improve students' conservation character	Journal of Turkish Science Education	Ekip Buro Makineleri A	2017
13	Atmojo	Learning which oriented on local wisdom to grow a positive appreciation of batik Jumputan (ikat celup method)	Indonesian Journal of Science Education	Semarang State University	2015
13	Uge, Neolaka, and Yasin	Development of social studies learning model based on local wisdom in improving students' knowledge and social attitude	International Journal of Instruction	Eskisehir Osmangazi University	2019
13	Sofyan, Anggereini, and Saadiah,	Development of e-module based on local wisdom in central learning model at kindergartens in Jambi city	European Journal of Educational Research	Eurasian Society of Educational Research	2019
12	Widiaty, Riza, Danuwijaya, Hurriyati, and Mubaroq	Mobile-based augmented reality for learning 3-dimensional spatial batik-based objects	Journal of Engineering Science and Technology	Taylor's University	2017
11	Betaaubun, Madya, and Margana	Reconceptualization of English learning in the border region of the republic of Indonesia-Papua New Guinea	International Journal of Mechanical Engineering and Technology	IAEME Publication	2018
11	Hartini, Misbah, Helda, and Dewantara	The effectiveness of physics learning material based on South Kalimantan local wisdom	4th ICRIEMS	American Institute of Physics Inc	2017
11	Ardan, Ardi, Hala, Supu, and Dirawan	Need assessment to development of biology textbook for high school class X - based the local wisdom of Timor	International Education Studies	Indonesian University of Education	2015

3.2.2. Co-occurrence analysis

Co-occurrence analysis or Co-word analysis is used to explore the existing or future relationship among topics in a research field by focusing on the written content of the publication [28]. Co-occurrence analysis in this study was performed based on the title of publication. By setting the minimum number of occurrences of a term was five, there were 16 selected terms such as "study", "student", "science", "physics", "model", "medium", "material", "local wisdom", "Indonesia", "implementation", "elementary school", "effectiveness", "development", "design", "character education", and "analysis" as shown in Table 8.

Table 8. Hierarchical clustering of term

Cluster	Term	Number of occurrences	Total link strength
Cluster 1 (Red)	Local wisdom	101	152
	Development	46	76
	Material	18	43
	Physics	14	29
	Science	12	18
	Medium	11	18
	Elementary school	8	12
	Effectiveness	6	15
Cluster 2 (Green)	Student	29	54
	Model	25	52
	Indonesia	9	14
	Implementation	8	12
	Character education	6	14
Cluster 3 (Blue)	Study	14	28
	Analysis	12	23
	Design	8	10

There were eight terms in red cluster, followed by five terms in green cluster and three terms in blue cluster. Table 7 shows that the most apparent occurrence in red cluster was the term "local wisdom" with 101 occurrences. It indicates that the term "local wisdom" appears in no more than 101 different papers. Meanwhile, the term "student" was the most apparent occurrence in green cluster in which it appeared 29 times. It means that the term "student" appears in no more than 29 different papers. On the other hand, the term "study" was the most apparent occurrence in blue cluster which appeared 14 times. It interprets that the term "study" appears in no more than 14 different papers. In general, from the three clusters, the term "local wisdom" was the most apparent occurrence. It could be strengthened by the density visualization in Figure 3.
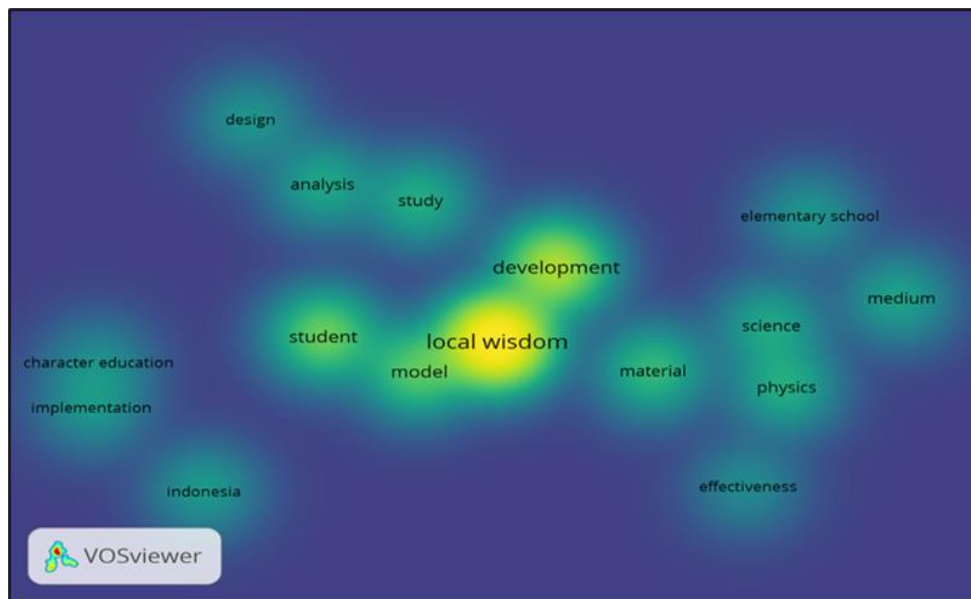
Figure 3. Density visualization

The collection of term in red cluster shows that there were some objects such as "local wisdom" and "material". Also, there was a scientific field, namely "science" specifically "physics", followed by an educational level, namely "elementary school". In addition, there was a process, namely "development", followed by a measurement, namely "effectiveness". On the other hand, the collection of term in green cluster reveals that there was a subject, namely "student", followed by a location, namely "Indonesia". In addition, "model" and "character education" were an object. Also, there was a process, namely "implementation". Meanwhile, the terms in blue cluster shows that there were some activities, namely "study" and "design". Also, there was a process, namely "analysis".

The term collection in red cluster linked to each other as shown in Figure 4, interprets that there is a development of local wisdom-based teaching material of science learning, especially physics learning in elementary school in which the development product of local wisdom-based teaching material is disseminated to see its effect. Meanwhile, the collection of term in green cluster connected to each other interprets that there is an implementation of character education model for Indonesian students. On the other hand, the term collection in blue cluster linked to each other interprets that there is an analysis study related to a design. Generally, these interpret that there is the study about the development of local wisdom-based teaching material for learning science, especially physics. The local wisdom-based teaching material is used in the implementation of learning model to educate the character of Indonesian elementary students so that an analysis will provide the information about its effect on students' character. Hidaayatullaah *et al*. [29], also reported that local wisdom studied in the area of physics learning.
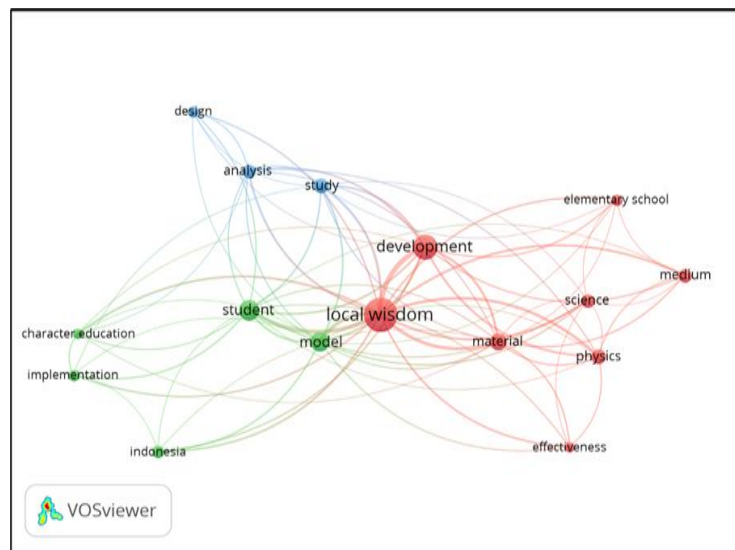
Figure 4. Network visualization

Figure 5 shows that some new terms appearing in the title of publication were such as "student", "elementary school", "analysis", "implementation", "study", and "design". Meanwhile, a few of old terms appearing in the publication title were such as "model" and "science". In addition, Figure 6 also reveals that studies about the development of local wisdom-based teaching material in science or physics learning to educate the character of Indonesian elementary students was trending in 2019.
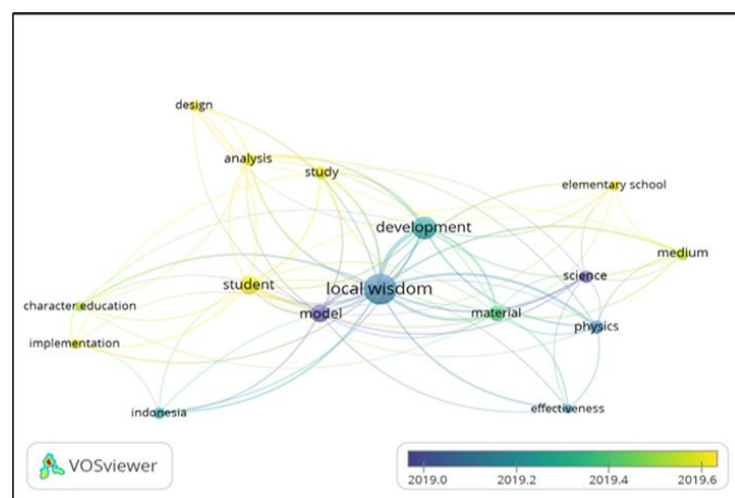

Figure 5. Overlay visualization

3.2.3. Co-authorship analysis

Co-authorship analysis in this study is used to examine the social relationship among authors on the development of the research field [28]. By establishing the minimum number of documents of an author was one document, there were 20 authors with the largest set of connected authors. The detail is presented in Table 9.

Table 9. Hierarchical clustering of authors

Cluster	Author(s)	Number of papers	Total link strength
Cluster 1 (Red)	Diliarosta	1	5
	Dillasamola	1	5
	Efendi	1	5
	Oktomalioputri	1	5
	Ramadhani	1	5
Cluster 2 (Green)	Hartadiyati	1	4
	Prasetia	1	4
	Rizqiyah	1	4
	Rusilowati	1	4
	Wiyanto	2	7
Cluster 3 (Blue)	Endahati	1	2
	Maisaroh	1	2
	Saleh	1	3
	Tresnawati	1	3
	Wardani	2	5
Cluster 4 (Yellow)	Khusniati	1	2
	Parmin	1	2
	Sudarmin	4	13
Cluster 5 (Purple)	Reffiane	1	3
	Saptono	1	3

Figure 6 shows that there were five authors in red cluster, followed by five authors in green cluster, five authors in blue cluster, three authors in yellow cluster, and two authors in purple cluster. The authors in red cluster simultaneously conducted the research about ethnomedicine-based science learning [22]. Some researches related to local wisdom-based Spermatophyta learning and ethno-science, technology, engineering, and math (STEM)-based science education were carried out by the authors in green cluster and purple cluster [56], [57]. The authors in blue cluster studied regarding local plants as the basic materials of batik natural dyes and local wisdom-based integrative learning model using multimedia animation [58], [59]. The research about local wisdom-based science learning model to improve students' conservationist character was studied by the authors in yellow cluster [52]. Figure 7 shows that the study carried by all of authors in red cluster was the new research published in 2021. Meanwhile, studies conducted by some authors in yellow cluster such as Khusniati and Parmin, and some authors in green cluster such as Hartadiyati, Prasetia, Rizqiyah, and Rusilowati, were the old researches published in 2017.
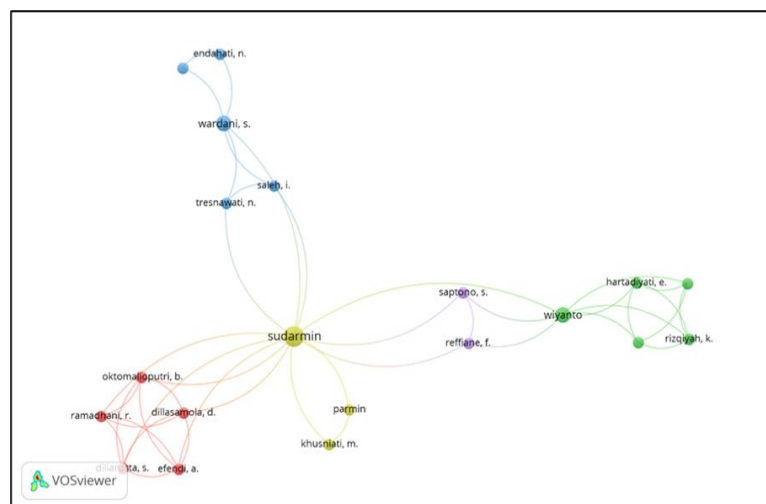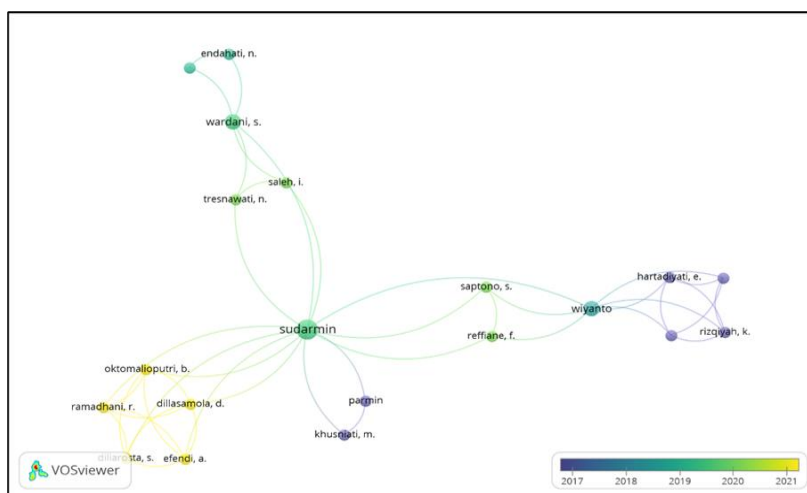

Figure 6. Author's network visualization

Figure 7. Author's overlay visualization

4. CONCLUSION

Review of research trends on local wisdom-based learning using bibliometric analysis provides some information that number of publications of many studies about local wisdom-based learning increase slightly in the period of 2012–2020, whereas the development of total citation tends to be fluctuated from 2012 to 2021. In addition, Institute of Physics Publishing and Indonesian Journal of Science Education were the top publisher and journal based on contribution and citation, where most of Indonesian researchers publish the influential papers about local wisdom-based learning. Trending research on "local wisdom-based learning" is the development of local wisdom-based teaching materials in science or physics learning to educate Indonesian elementary students' character in which ethno-medicine-based science learning is new research topic.

This study directs researchers in history education that studies related to the development of local wisdom-based history teaching materials and the use of local wisdom-based teaching material in the implementation of history learning are the future research topic in history education. The future researches are expected to strengthen students' national identity and character by implementing local wisdom-based history learning. Furthermore, this study only involved Scopus database as a search engine to find the document that it has not represented all of documents. Therefore, the involvement of many databases is needed such as Web of Science.

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