International Journal of Evaluation and Research in Education (IJERE)
Vol. 13, No. 5, October 2024, pp. 3544~3559
ISSN: 2252-8822, DOI: 10.11591/ijere.v13i5.27662

Reading comprehension studies in the last decade: global trends and future direction of Indonesia language researches

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Article Info

Article history:

Received Jun 5, 2023
Revised Feb 13, 2024
Accepted Mar 6, 2024

Keywords:

Bibliometric analysis
Indonesia language
Reading comprehension
Scopus
VOSviewer

ABSTRACT

The publication trend related to reading comprehension studies in the last decade has sharply grown. Nevertheless, studies offering comprehensive bibliometric and bibliographic reviews related to reading comprehension studies have not been conducted nor also found in the journal or conference proceeding. The purpose of this study is to present a bibliographic and bibliometric review of the numerous documents studying reading comprehension skills. A bibliometric analysis was performed to carry out this study whereby 1,681 eligible documents from the Scopus database published from 2013 to 2022 were used as research materials. Results showed that in 2013-2022, the publication trend of reading comprehension studies slightly increased while the citation trend on the documents regarding reading comprehension skills tended to fall sharply. Additionally, at least there were several major emerging themes of reading comprehension studies such as methodology, language, educational level, reading disability, reading intervention, reading comprehension predictor, and moderating factor of reading comprehension. This study implies that researchers in the field of Indonesian language education can focus on the utilization of Indonesian textbooks in investigating learners' reading comprehension skills, develop innovative and effective reading interventions to enhance learners' reading comprehension skills, and explore some other moderating factors of reading comprehension skills such as ethnicity, culture, geographical location, and textbook topic.

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1. INTRODUCTION

Reading, one of the essential skills required in the learning process, is an activity to absorb the information from the text to understand the topic or material of the current subject [1]. Additionally, it is necessary for students to develop their personal and academic achievements. Kovachy *et al*. [2] stated that reading consists of two fundamental skills: single-word reading (decoding) and reading comprehension. Moreover, Kovachy *et al*. [2] explained that decoding refers to precisely recognizing written words and recovering word-level information from the mental lexicon. Meanwhile, de-la-Pena and Luque-Rojas [3] argued that reading comprehension refers to the skill to acquire meanings and establish interpretations of

written words and sentences. Both decoding and reading comprehension depend on many linguistic and cognitive skills. However, they are partially independent constituents whereby decoding comes from linguistic skills such as alphabet knowledge and phonological awareness. In contrast, reading comprehension needs to integrate linguistics skills and cognitive processes such as morphological awareness and fluency. This indicates that a skilled reader's decoding and reading comprehension proficiency is essential.

Mainly related to reading comprehension, Choi and Zhang [4] defined it as a constructive process in which the reader generates a mental representation of the meaning of a text when factors such as reader, text, and activity interact. Additionally, reading comprehension is the ability to understand and interpret a text read by the reader to get the information from written sources, analyze the meaning of a text, and decide the way to connect between prior knowledge and the purpose of the reader [1]. Moreover, Spencer and Wagner [5] stated that reading comprehension is an intricate process embroiling various linguistic and cognitive skills. This shows that reading comprehension involves the complex ability to understand a text and represent knowledge. Based on the simple view, reading comprehension is generated by combining word recognition and linguistic comprehension [5], [6]. Specifically, Hjetland *et al*. [6] stated that word recognition is related to the skill to translate written words into speech while linguistic comprehension is related to the skill to understand and interpret the meaning of the spoken language. Both word recognition and linguistic comprehension are prominent for reading, independently contributing to reading comprehension.

Reading comprehension has become essential in determining learners' academic success in every scientific field. In particular, it is closely related to the achievement level of some subjects such as mathematics, science, and language literature [7]. Additionally, reading comprehension is essential for cultural and social participation, academic achievement, and successful functioning in current societies [8]. In line with this, reading comprehension can reliably predict the academic outcome of many learners [9]. Thus, reading comprehension is important to the learners' successful academic achievement and outcome in each scientific field studied. As a consequence, the ability or skill has to be developed or enhanced in all environmental learning, especially in language learning so that the alternatively effective interventions have to be tried overall in developing and enhancing reading comprehension. Several studies have implemented various instructions to enhance the learners' reading comprehension skills such as mobile-assisted language learning [10], adjunct model [11], visual literacy program [12], reflection-based reciprocal teaching approach [13], gamified e-reading experience [14], e-mental schemata and metacognitive strategy [15]. This shows that there is a development of the studies working to enhance reading comprehension skills.

So far, the publication of the studies related to reading comprehension in the linguistic field has sharply grown. The reports providing a review related to the trend and development of reading comprehension studies are essential for linguistic researchers. Nevertheless, the reports related to the review of reading comprehension skills have not seemed to be published in electronic journals, conference proceedings, books, or book series. Moreover, some previously relevant literature review researches only have studied reading literacy and abilities [2], [16], reading strategy [17]–[19], reading intervention [20]–[22], reading assessment [23], reading media [24], and reading environment [25]. This current study, however, mainly focuses to present the information regarding the development of publication and citation of reading comprehension studies, the productive and influential documents, authors, countries, institutions, and sources contributing most to reading comprehension studies, the social interactions among authors, authors' countries, and authors' institutions of reading comprehension studies, and the emerging research trend of reading comprehension studies in current period. Therefore, the aim of this present study is to provide a bibliometric and bibliographic review of the studies related to reading comprehension in 2013-2022.

2. METHOD

To present a bibliometric and bibliographic review of reading comprehension studies, a bibliometric analysis was performed. Moreover, Donthu *et al*. [26] argued that bibliometric analysis is a well-known and harsh method to explore and analyze the large volumes of scientific data in which it can get a one-step overview, acquire novel ideas for next researches, and recognize knowledge gaps. There were five stages to carry out bibliometric analysis that were: i) specifying the search keyword; ii) exploring initial search results; iii) refining the documents; iv) compiling the initially statistical data; and v) analyzing the data [27], [28]. Particularly, every stage to conduct bibliometric analysis in this study was elucidated in the subsections.

2.1. Specifying the search keyword

To discover the documents regarding reading comprehension studies, Scopus database was utilized in that it had many electronically well-qualified documents from numerous scientific field [29]. The specific keyword ("reading comprehension") was established to seek the prospective documents which was suitable to the studies related to reading comprehension. The search process of documents in Scopus database was performed in December 31st, 2022, specifically at 11.59 PM in Western Indonesian Time.

2.2. Exploring initial search results

The results of initial search discovered 25,670 documents published in the period of 1894-2022 and sourced from journal, book, conference proceeding, and book series. The publication stage of documents was in final and press whereby those consisted of article, book chapter, conference paper, review, editorial, conference review, book, note, short survey, letter, erratum, and data paper. The documents were written in a lot of languages such as English, Spanish, French, Portuguese, German, Chinese, Japanese, Turkish, Italian, Russian, Korean, Persian, Slovenian, Dutch, Croatian, Hungarian, Serbian, African, Polish, Slovak, Estonian, Czech, Bosnian, Malay, Norwegian, Lithuanian, Catalan, Arabic, Finnish, Danish, Greek, Indonesian, Romanian, and Swedish.

2.3. Refining the documents

To gain the documents related to reading comprehension studies, some inclusion criteria were established. Firstly, the title of document had to contain the keyword "reading comprehension". Secondly, the document was only written in English and the publication stage of document had been in final. Thirdly, the document only sourced from the journal and the type of document was only in article. Fourthly, the document was published in the period of 2013-2022. The document which did not meet the inclusion criteria were removed from the selection process. Some literatures stated that there were five steps to select the document systematically that were: i) identification, ii) screening, iii) eligibility, and iv) inclusion [30]–[37]. The process of document selection is systematically presented in Figure 1.

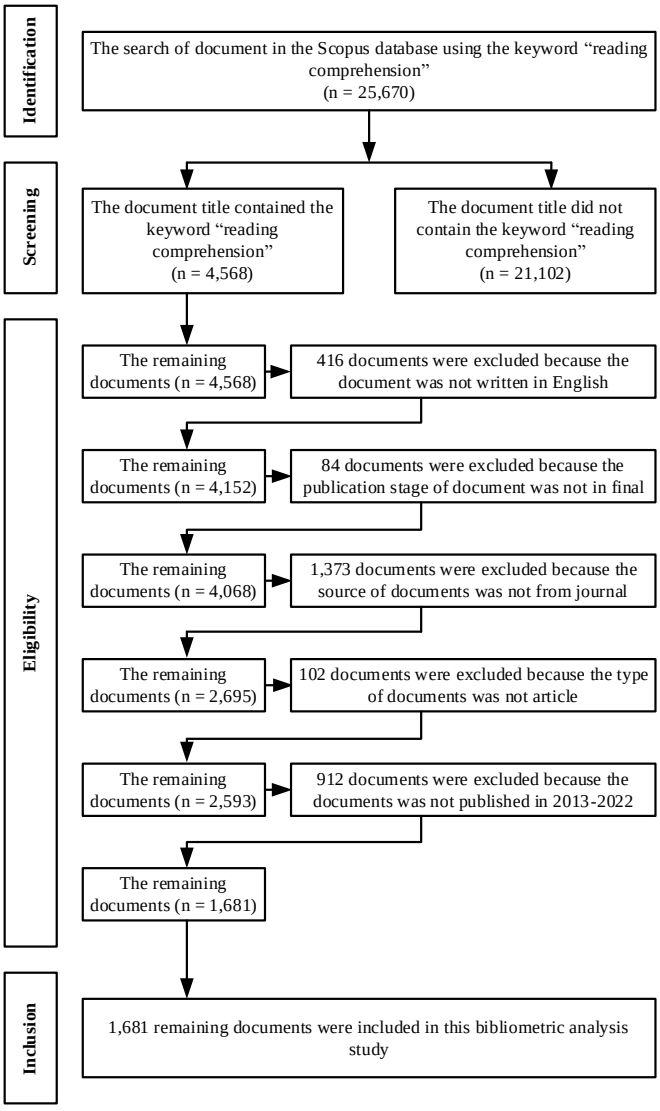

Figure 1. The process of document selection

2.4. Compiling the initially statistical data

The eligible documents were downloaded from Scopus database in two formats that were comma separated values (CSV) and research information system (RIS) whereby the formats contained some information such as bibliometric information, abstract and keyword, and bibliographic information [38]. Additionally, the RIS format presented in the software of Perish or Publish (PoP) provided the data such as author names, number of document citations, document titles, publication years, document sources, publishers, and document types [27]. Moreover, the appearance of PoP software presented the descriptive analysis summary such as the total of publication (TP), the total of citation (TC), the number of citations per year (NCY), the number of citations per publication (NCP), the number of authors per publication (NAP), h-index, g-index, and the period of publication and citation years [38]. On the other hand, the CSV format presented in the software of VOSviewer displayed the most numerous publication and citation viewed from the unit of document, author, country, source, and institution, and also keyword occurrence, total of strength link, some visualizations, and clustering [27].

2.5. Analyzing the data

Some analyses such as performance analysis, citation analysis, co-authorship analysis, and co-word analysis were performed to analyze the data. In particular, performance analysis was applied to present the development of publication and citation of reading comprehension studies in the last decade. In addition, citation analysis was used to provide the information regarding the productive and influential documents, authors, countries, institutions, and sources contributing most to reading comprehension studies. Moreover, co-authorship analysis was performed to show the social interactions among authors and authors' countries related to reading comprehension studies. Then, co-word analysis was employed to present the most frequently emerging keywords and the distribution of appearing keywords regarding reading comprehension studies in the current period in which at least it could provide the synthesis related to some predictors of reading comprehension skills and several interventions or treatments to enhance the learners' reading comprehension skills. Co-authorship and co-word analysis were enriched by some additional analyses such as visualization analysis and clustering analysis. According to Fuad *et al*. [27], performance analysis could be supported by the software of PoP. In contrast, the software of VOSviewer supported other analyses such as citation analysis, co-authorship analysis, and co-word analysis.

3. RESULTS AND DISCUSSION

3.1. The development of publication and citation of reading comprehension studies

Performance analysis was performed to show the development of the publication and citation of reading comprehension studies between 2013 and 2022. The report related to the development of publication and citation of reading comprehension studies is presented in Figure 2. The development of publications of the studies related to reading comprehension slightly soared from 2013 until 2022. This show that reading comprehension skills are the research topic greatly interested by many linguistic researchers. In line to Lan and Yu [16], the trend of studies related to reading literacy also showed the publication development that tended to increase in the period of 2008-2022. Additionally, Ismail [18] also revealed that the development of publication of reading strategy studies sharply jump from 2016 to 2020. Nevertheless, Meitifazahra *et al.* [1] reported that the publication trend of the studies related to reading intervention tends to fluctuate between 2012 and 2022. Moreover, the number of publications of reading media studies slightly decreased from 2014 to 2021 [17]. These reports show that the publication trend of reading comprehension studies is different to some studies such as reading intervention and reading media whereby the research trend of the studies regarding reading comprehension consistently increase in the last decade. According to Friesen and Frid [39], reading comprehension skills contributed most to a lot of the learners' language proficiencies such as English, Korean, Japanese, and Chinese. More general, reading comprehension abilities have the extremely important role for the learners in understanding and interpreting the concept or theory of numerous scientific fields such as mathematics and sciences [40]. These reasons support why the publication trend of studies related to reading comprehension skills steadfastly soars in the last decade.

In contrast to the publication trend, the development of citations of the documents which studied reading comprehension skills slightly fell down in the period of 2013-2022. This indicates that the longer a document is published, the more citations gotten from the document. In a previously relevant literature, Lan and Yu [16] revealed the different report in which the citation trend of the studies related to reading literacy sharply increased between 2008 and 2022. This shows that the publication trend of reading literacy studies is equivalent to the citation trend of reading literacy studies, whereas the development of citations of reading comprehension studies is not directly proportional to the development of publication of reading comprehension studies. Moreover, this interprets that the influence and contribution of documents on lots of scientific fields highly decide the number of citations on the documents. The most influent documents were

widely cited by other relevant documents [27]. Moreover, Muhammad *et al*. [38] also argued that the documents contributing most to the specific studies become the references for other pertinent documents. These reports reflect that the most influent documents contributing most to reading comprehension studies will support the development of studies related to reading comprehension skills by citing the documents.

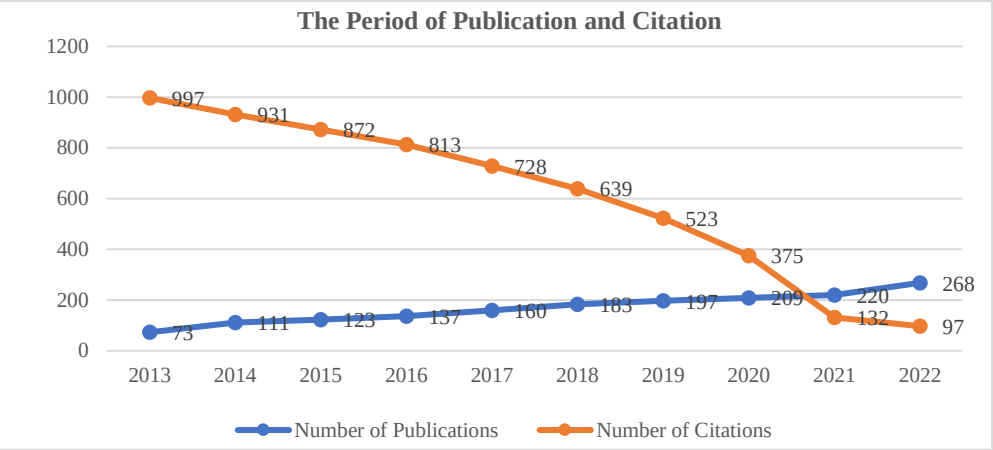

Figure 2. The development of publication and citation of reading comprehension studies

3.2. The most productive and influential documents, authors, countries, institutions, and sources contributing to reading comprehension studies

Citation analysis was performed to present the productive and influential documents, authors, countries, institutions, and sources contributing most to reading comprehension studies. According to Muhammad *et al*. [38], the most productive documents, authors, countries, institutions, and sources were measured by the number of publications. In contrast, the most influential documents, authors, countries, institutions, and sources were measured using the number of citations.

Firstly, the most influential documents of reading comprehension studies were presented by the top five documents with the highest citation that can be presented Table 1. The article entitled "Reading linear texts on paper versus computer screen: effects on reading comprehension" was the most influential document which studied reading comprehension skills. The document compares between the effect of reading linear texts on paper and the effect of reading linear texts on computer screen, and also its impact on reading comprehension skills. The effect of reading texts on paper was significantly higher on students' reading comprehension skills than the effect of reading text on computer screen [41]. This interprets that the use of reading texts on paper is more effective in enhancing students' reading comprehension skills than the use of reading texts on computer screen. Additionally, it shows that reading media used to read the texts extremely determines students' reading comprehension abilities. As a consequence, the readers should notice the effective reading media in enhancing their reading comprehension skills.

Table 1. Top five document of reading comprehension studies with the highest citation

No	Title	Source	Author	Year	Citation
1	"Reading linear texts on paper versus computer screen: effects on reading comprehension"	International Journal of Educational Research	Mangen *et al*.	2013	378
2	"Decoding and reading comprehension: a meta-analysis to identify which reader and assessment characteristics influence the strength of the relationship in English"	Review of Educational Research	Garca and Cain	2014	250
3	"Mind wandering and reading comprehension: examining the roles of working memory capacity, interest, motivation, and topic experience"	Journal of Experimental Psychology: Learning Memory and Cognition	Unsworth and McMilan	2013	191
4	"Reading comprehension and its underlying components in second-language learners: a meta-analysis of studies comparing first-and second-language learners"	Psychological Bulletin	Melby-Lervayg *et al*.	2014	164
5	"A meta-analysis of the reading comprehension skills of individuals on the autism spectrum"	Journal of Autism and Developmental Disorders	Brown *et al*.	2013	144

Secondly, the most productive and influential authors regarding reading comprehension studies were presented by top five authors with the highest publication and citation as shown in Table 2. The most productive author published 17 documents related to reading comprehension skills in the last decade. His articles studied some topics such as the effect of decoding and language factors on reading comprehension skills [42], direct and indirect links between reading skills and reading comprehension [43], the relation of silent reading fluency to reading comprehension skills [44], latent decoding and language for reading comprehension skills [45], reading comprehension and vocabulary knowledge [9], and the impact of vocabulary knowledge and spelling on reading comprehension skills [46]. These reports show that the studies of Petscher, Y. focus on the contribution of some factors such as decoding, language, fluency, and vocabulary to reading comprehension skills. Furthermore, the most influential author published one document entitled "the simple view of reading". The article written and published by Gough, P. B., and Hoover., W. A. had been cited as many as 1,550 times by other relevant articles.

Thirdly, the most productive and influential countries regarding reading comprehension studies were presented by top five countries with the highest publication and citation as presented in Table 3. Both Petsher and Gough came from United States whereby United States was the most productive and influential country contributing to reading comprehension skills in the period of 2013-2022. In line to Meitifazahra *et al*. [1], United States was the most productive country which had published 7 documents of studies related to reading intervention from 2012 to 2022. Additionally, Lan and Yu [16] also revealed that United States was the most influential country in which the documents of the studies regarding reading literacy had been cited as many as 890 times between 2008 and 2022. These reports support that United States and also authors who affiliated in this country are the productive and influential country contributing most to reading comprehension studies in the period of 2013-2022 in which the numerous studies related to reading comprehension skills conducted have been referred and used by a lot of researchers in the linguistic field.

Fourthly, the most productive and influential institutions regarding reading comprehension studies were presented by top five institutions with the highest publication and citation as shown in Table 4. Petscher was an author who affiliated in Florida State University, United States and Gough was an author who affiliated in Texas University, United States in which Florida State University was the most productive institution which had published six documents related to reading comprehension studies while Texas University was the most influential institution in which its published articles regarding reading comprehension studies had been cited as many as 550 times by other relevant articles in the last decade. This shows that the institutions located in United States contribute most to reading comprehension studies. Lan and Yu [16] also revealed that United States had several educational institutions which contributed most to reading literacy studies.

Fifthly, the most productive and influential sources regarding reading comprehension studies were presented by top five sources with the highest publication and citation as shown in Table 5. Most of articles written and authorized by top five authors with the highest publication were published in Reading and Writing which was the most productive and influential source contributing most to reading comprehension studies. Reading and writing was the most influential source whereby its published articles related to reading literacy studies had been cited as many as 145 times from 2008 until 2022 [16]. This report promotes that reading and writing contributes most to the development of reading comprehension studies.

Table 2. Top five authors regarding reading comprehension studies with the highest publication and citation

Top five most productive authors			Top five most influential authors		
Author	TP	Institution	Author	TC	Institution
Petscher, Y.	17	Florida State University, United States	Gough, P. B.	1,550	Texas University, United Sates
Verhoeven, L.	17	Radboud University, Netherlands	Hoover, W. A.	1,550	Southwest Educational Development Laboratory, United States
Cain, K.	13	Lancaster University, United Kingdom	Cain, K.	1,052	Lancaster University, United Kingdom
Vaughn, S.	13	Texas University, United Sates	Nation, K.	896	Oxford University, United Kingdom
Carretti, B.	11	Padova University, Italy	Lesaux, N. K.	894	Harvard University, United States

Table 3. Top 10 countries regarding reading comprehension studies with the highest publication and citation

Top five most productive countries			Top five most influential countries		
Country	TP	Continent	Country	TC	Continent
United States	517	America	United States	919	America
Iran	146	Asia	Canada	412	America
China	103	Asia	United Kingdom	302	Europe
Canada	92	America	Netherlands	253	Europe
United Kingdom	92	Europe	Germany	211	Europe

Table 4. Top 10 institutions regarding reading comprehension studies with the highest publication and citation

Top five most productive institutions			Top five most influential institutions		
Institution	TP	Country	Institution	TC	Country
Florida State University	6	United States	Texas University	550	United States
Islamic Azad University	5	Iran	Harvard University	493	United States
Harvard University	5	United States	Carleton University	451	Canada
Georgia State University	5	United States	Memphis University	373	United States
Hong Kong University	5	Hong Kong	Queen University	323	Canada

Table 5. Top 10 sources regarding reading comprehension studies with the highest publication and citation

Top five most productive sources			Top five most influential sources		
Source	TP	Publisher	Source	TC	Publisher
Reading and Writing	143	Springer	Reading and Writing	916	Springer
Journal of Educational Psychology	53	APA	Journal of Educational Psychology	822	APA
Learning and Individual Differences	45	Elsevier	Journal of Experimental Child Psychology	734	Elsevier
Frontiers in Psychology	34	Frontiers Media	Journal of Learning Disabilities	653	SAGE
Theory and Practice in Language Studies	31	Academy Publication	Learning and Individual Differences	514	Elsevier

3.3. The social interactions among authors and countries regarding reading comprehension studies

Co-authorship analysis was used to show the social interactions among authors and authors' countries of the studies related to reading comprehension skills. Network visualization and clustering analysis was also involved to enrich this analysis [27], [38]. The visualization analysis among authors was conducted by selecting the minimum number of documents of an author as many as five documents and the minimum number of citations of an author as many as no citation. As a result, 48 interconnected authors distributed into nine clusters such as red, green, blue, yellow, purple, blue-sky, orange, brown, and pink emerged as presented in Figure 3. Some authors in blue cluster were linked to other authors such as Francis and Vaughn in purple cluster, Lesaux in yellow cluster, Li in red cluster, Petrill and Catts in green cluster, and Solari in brown cluster. They in common worked some studies related to causal indicator modelling framework and reading comprehension skills [47], relations among morphological awareness dimensions, vocabulary knowledge, and reading comprehension [48], and the relation of silent reading fluency to reading comprehension [44]. This shows that they focus in investigating the relation between reading comprehension and some factors such as morphological awareness dimension, vocabulary knowledge, and silent reading fluency. Furthermore, few authors in purple cluster were connected to Petscher and Foorman in blue cluster and Choe in yellow cluster whereby they jointly studied some topics such as the intervention of vocabulary and main idea reading on content knowledge and reading comprehension [49], reading comprehension intervention for students' autism spectrum disorders [50], and the relation between cognitive difficulties and reading comprehension [51]. This shows that their studies focus on the interventions to enhance reading comprehension skills.

Several authors in yellow cluster were associated to few other authors such as Vaughn in purple cluster, Kim in blue cluster, and Deacon in green cluster. Together, they investigated some studies such as comorbidity in reading comprehension [52] and executive functions and reading comprehension growth [53] in which they focus on the topic related to the comorbidity, executive functions, and reading comprehension. Additionally, some authors in green cluster were hooked to many other authors such as Petscher and Schatschneider in blue cluster, Keenan and Olson in pink cluster, Solari in brown cluster, Zhang and Chen in red cluster, Kieffer in yellow cluster, and Shu in orange cluster. They simultaneously worked one study related to pressure points in reading comprehension [54]. Then, some authors in orange cluster were related to other authors such as Tong in green cluster and Zhang, J., Zhang, Z., and Zhao, H in red cluster whereby they jointly studied one topic regarding university students with poor reading comprehension [55]. In addition, few authors in pink cluster were linked to an author who was Petrill in green cluster in which they in common worked a study related to cognitive and language skills in poor reading comprehension [56]. These show that authors in green, orange, and pink cluster focus on some predictors such as pressure points, cognitive and language skills in poor reading comprehension.

A lot of authors in red cluster were connected to other authors such as Tighe in blue cluster, Tong in green cluster, Shu and Zhang in orange cluster, and Lei in blue-sky cluster. Simultaneously, they studied some topics such as visual search and reading comprehension [57], target-oriented opinion word extraction and reading comprehension model [58], incremental BERT with common sense representations for multi-choice reading comprehension [59], multi-turn dialogue reading comprehension with pivot turns and knowledge and syntax-aware multi-spans generation for reading comprehension [60]. Then, some authors in

brown cluster were linked to Petscher in blue cluster and Catts in green cluster in which concurrently they investigated some studies such as the relation between text reading fluency and reading comprehension [61], reading comprehension development [62], the scope and nature of reading comprehension impairment [63], the relation of narrative retelling and inference abilities to reading comprehension [64], and social cognition and reading comprehension [65]. Additionally, few authors in blue-sky cluster were associated to Zhao and Li in red cluster whereby they jointly worked some studies related to web-based reading comprehension [66], web-based intelligent tutoring system for content area reading comprehension [67], web-based text structure instruction for content area reading comprehension [68], textbook content and organization for reading comprehension [69], and reading textbooks for higher order reading comprehension [70]. These show that their studies focus on the use of website technology in enhancing reading comprehension skills.

Moreover, the visualization analysis among authors' countries was carried out by selecting the minimum number of documents of an author as many as ten documents and the minimum number of citations of an author as many as no citation. As a result, 31 interconnected authors distributed into six clusters such as red, green, blue, yellow, purple, and blue-sky appeared as shown in Figure 4. Regarding the social interactions among countries in conducting reading comprehension studies, Iran, a leading country in blue cluster was connected to South Korea in blue-sky cluster, Australia in yellow cluster, and Canada, Germany New Zealand, Turkey, and United States in red cluster. Additionally, China, a leading country in purple cluster was associated to Japan & Saudi Arabia in blue cluster, Canada and United States in red cluster, Belgium in green cluster, and United Kingdom in blue-sky cluster. Then, Norway, a leading country in yellow cluster was hooked to United States in red cluster and Spain in green cluster. In addition, Spain, a leading country in green cluster was related to United Kingdom in blue-sky cluster, United States in red cluster, and Norway in yellow cluster. Moreover, United States was the leading author in red cluster whereby it was linked to many countries such as Singapore and China in purple cluster, Iran, Japan, Jordan, and Malaysia in blue cluster, South Korea and United Kingdom in blue-sky cluster, Australia, Norway and Sweden in yellow cluster, and Netherlands, Spain, France, and Chile in green cluster. Subsequently, United Kingdom, a leading country in blue-sky cluster was connected to Australia, Norway, and Sweden in yellow cluster, Netherlands, Italy, France and Spain in green cluster, Hong Kong and China in purple cluster, Japan and Saudi Arabia in blue cluster, and New Zealand, Canada, Germany, and United States in red cluster. This shows that United States is linked to other leading countries in every cluster such as Iran, China, Spain, Norway, and United Kingdom. It means that it jointly worked the studies related to reading comprehension skills with few countries in Asia and Europe. In line to Meitifazahra *et al.* [1], in common United States and some countries in Europe and Asia worked reading literacy studies.

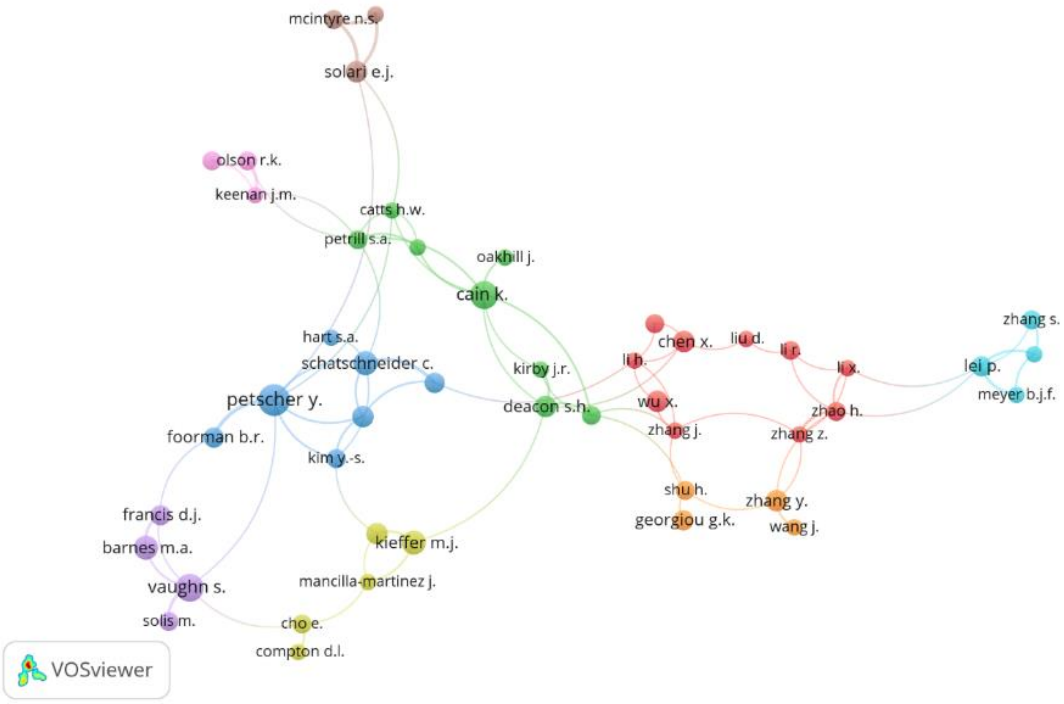

Figure 3. The social interactions among authors regarding reading comprehension studies

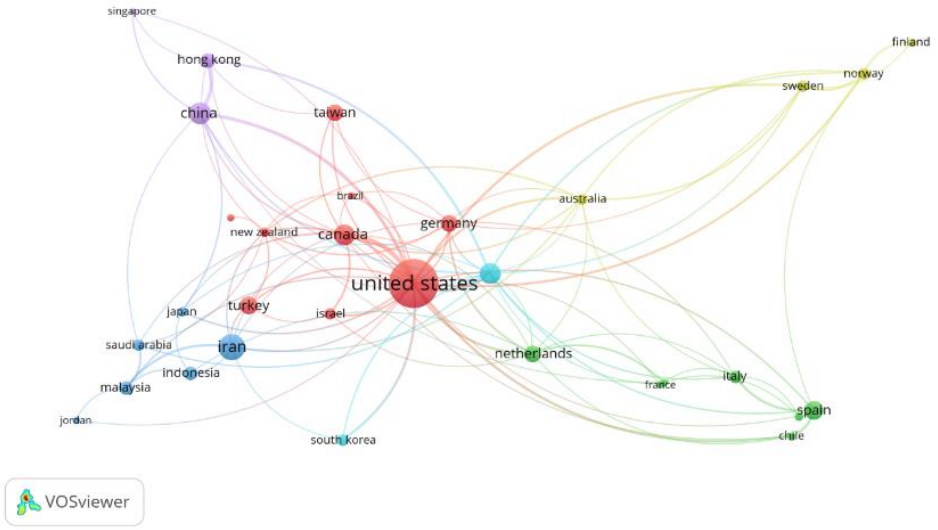

Figure 4. The social interactions among authors' countries regarding reading comprehension studies

3.4. The theme of reading comprehension studies and its distribution in the most current period

Co-word analysis was performed to present the frequently emerging keywords and the distribution of appearing keywords regarding reading comprehension studies in the current period. Moreover, at least it provided the synthesis related to some predictors of reading comprehension skills and several interventions or treatments to enhance the learners' reading comprehension skills. The network visualization analysis was conducted to show the frequently emerging keywords regarding reading comprehension skills. The minimum number of occurrences of a keyword as many as five occurrences were selected, so 97 interconnected keywords appeared as presented in Figure 5. Moreover, hierarchical clustering analysis was performed to group some similarly emerging keywords into a theme as shown in Table 6.

Additionally, the overlay visualization analysis was conducted to present the distribution of appearing keywords regarding reading comprehension studies in the current period. The minimum number of occurrences of a keyword as many as five occurrences were selected. So, 97 interconnected keywords appeared as shown in Figure 6.

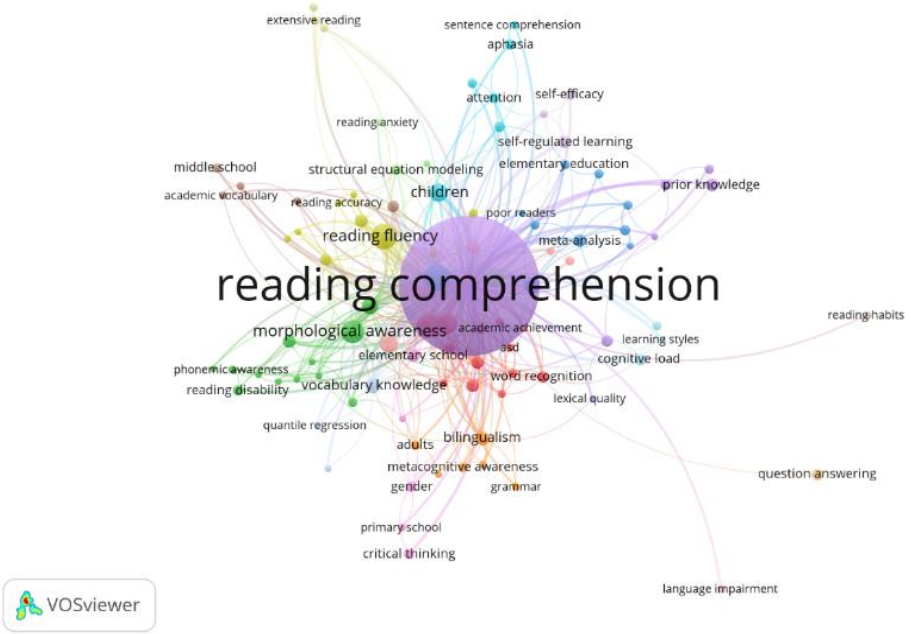

Figure 5. The network visualization of emerging keywords on reading comprehension studies

Table 6. The theme of emerging keywords regarding reading comprehension studies

Theme	Keyword	Frequency
Methodology	Meta-analysis	13
	Structure equation model	10
	Longitudinal study	9
	Quantile regression	5
	Path analysis	5
Learning and reading disability	Dyslexia	27
	Aphasia	9
	ADHD	7
	Autism spectrum disorder	6
	Down syndrome	6
Language	Chinese	16
	English	11
	Spanish	8
	Arabic	5
Educational level	Middle school	7
	High school	6
	Primary school	6
	Higher education	5
Reading comprehension intervention	Self-regulated learning	14
	Reciprocal teaching	10
	Vocabulary learning	8
	Cooperative learning	7
Reading comprehension predictor	Morphological awareness	46
	Phonological awareness	21
	Vocabulary knowledge	18
	Syntactic awareness	13
	Word decoding	13
	Word recognition	12
	Metacognitive awareness	8
	Phonemic awareness	6
	Syntactic knowledge	5
	Morphological knowledge	5
	Working memory	59
	Reading motivation	32
Moderating factor of reading comprehension	Self-efficacy	10
	Gender	10
	Reading anxiety	5
	Learning styles	5
	Socio-economic status	5

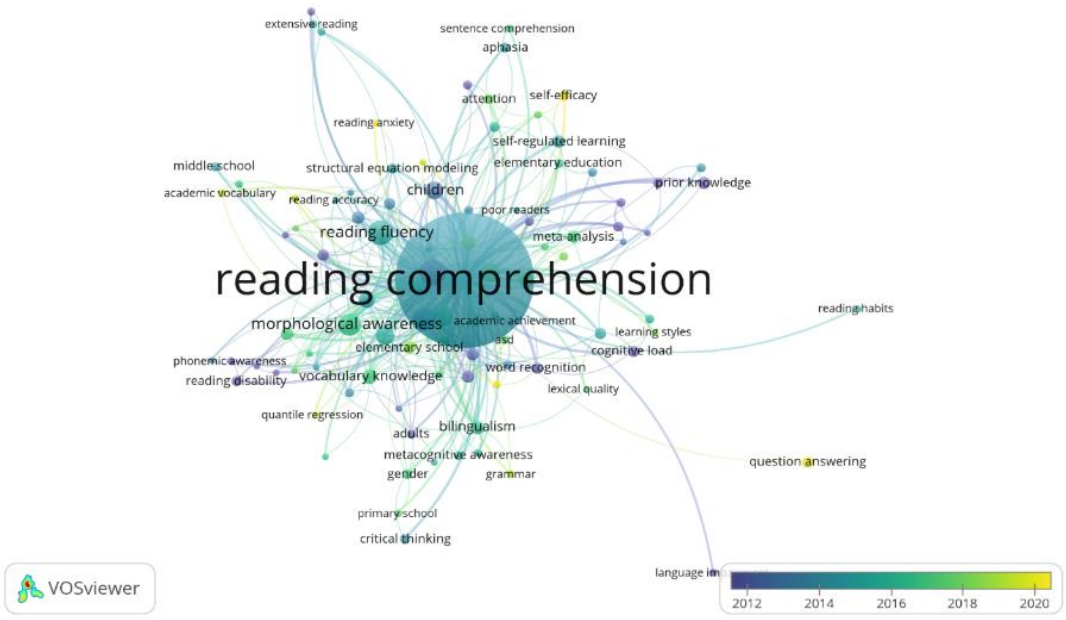

Figure 6. The overlay visualization of emerging keywords on reading comprehension studies

At least there were four keywords emerged in the most current period such as "reading anxiety", "autism spectrum disorder", "self-efficacy", and "question answering". Hierarchical clustering analysis shows that at least there were eight mainly emerging themes related reading comprehension studies. The first theme was related to methodology used to conduct reading comprehension studies whereby there were some analyses performed to analyze the data such as meta-analysis, structure equation model, regression, and path analysis. Meta-analysis was mostly applied in few studies to examine the significance of the effectiveness of reading interventions on reading comprehension skills [71]. Additionally, regression analysis was also mostly performed in some studies to investigate and examine the effect of reading predictors on reading comprehension skills [72]. Moreover, structure equation model and path analysis were mostly used several studies to investigate and examine the relation and effect of many reading factors on reading comprehension skills [73]. These show that the analyses become a trend in conducting reading comprehension studies.

The second theme was related to learning and reading disability in which it was a barrier in achieving reading comprehension skills. There were several reading disabilities that could obstruct readers in enhancing their reading comprehension skills such as dyslexia, aphasia, ADHD, autism spectrum disorder, and down syndrome. Dyslexia and aphasia refer to the incompetence of the readers to read the text that are not affected by the factor of psychology or non-psychology [74]. As a consequence, those disabilities must be treated to reduce their effect on the learners' reading comprehension skills. Then, the third theme was related to languages in the texts used in developing reading comprehension skills such as Chinese, English, Spanish, and Arabic. This indicates that generally, English is applied in most of textbooks because it is internationally official language [75]. Particularly, Arabic was applied in textbooks in most of mid-east countries such as Arab Saudi, Iraq, Kuwait, and Uni Emirates Arab [76]. Additionally, Chinese was applied in textbooks in most of East Asian countries such as China, Hong Kong, Taiwan, and Macau [77].

The fourth theme was related to educational level whereby the enhancement of reading comprehension skills was carried out in primary, middle, and high school, and also higher education, so many participants in these educational levels were involved in conducting reading comprehension studies. A few of empirical researches in carrying out reading comprehension studies involved primary school students [78], middle school students [79], high school students [80] and also college students [81]. Furthermore, the fifth theme was related to reading interventions in enhancing reading comprehension skills such as self-regulated learning, reciprocal teaching, vocabulary learning, and cooperative learning. A study applied vocabulary learning as a reading intervention to enhance reading comprehension skills [82]. A study also implemented cooperative learnings such Jigsaw and number head together in enhancing the learners' reading comprehension skills [83]. Additionally, a research also used reciprocal teaching as a reading intervention in enhancing the readers' reading comprehension skills [13]. Moreover, a research applied self-regulated learning to treat the learners' reading comprehension skills [84]. These indicate that the interventions are mostly applied to develop the learners' reading comprehension skills because they have significantly positive effect in enhancing reading comprehension skills.

The sixth theme was related to the predictors of reading comprehension skills such as morphological awareness and knowledge, syntactic awareness and knowledge, phonological awareness, vocabulary knowledge, phonemic awareness, metacognitive awareness, and word decoding and recognition. A study revealed that vocabulary awareness and knowledge have positive relation on reading comprehension skills [85]. Moreover, Vaknin-Nusbaum and Sarid [86] reported that morphological awareness consists of inflectional and derivational awareness is associated with higher reading comprehension skills. Additionally, a study showed that syntactic awareness and knowledge have significantly positive effect on reading comprehension skills [87]. Vocabulary knowledge also played a significant role in reading comprehension skills [88]. Subsequently, phonological awareness was positively related to reading comprehension skills [89]. In addition, metacognitive awareness had the significant role in reading comprehension skills [90]. Phonemic awareness had the significant influence on reading comprehension skills [91]. These show that the reading predictors have significant role in the enhancement of reading comprehension skills.

The seventh theme was related to reading comprehension factors indirectly affecting the enhancement of reading comprehension skills such as working memory, reading motivation, self-efficacy, gender, reading anxiety, learning styles, and socio-economic status. The enhancement of reading comprehension skills by applying reading interventions was mediated by few factors such as working memory [92], and learning styles [80]. Moreover, some affective factors such as motivation, self-efficacy, and anxiety also contributed in moderating the enhancement of reading comprehension skills by implementing reading strategies or reading instructions [80]. Additionally, the development of reading comprehension skills by using reading media and reading assessment was also moderated by several factors such as gender [93], and socio-economic status [94]. Even though these moderating factors directly did not influence the enhancement of reading comprehension skills, they had significant role in mediating the development of reading comprehension skills by using reading interventions, reading media, and reading

assessment, mainly related to affective factors such as anxiety and self-efficacy. Moreover, the distribution of the most emerging keyword regarding reading comprehension studies in the most recent period presented that few keywords such as "reading anxiety" and "self-efficacy" were mostly appeared in the end of 2020. This interprets that the involvement of reading anxiety and self-efficacy in mediating the enhancement of reading comprehension skills becomes the current trend in reading comprehension studies. As a consequence, these affective factors have to be treated seriously, so the level of learners' anxiety can be reduced and the level of learners' self-efficacy can be enhanced in which these can contribute most to enhance learners' reading comprehension skills.

4. CONCLUSION

This study provides some important bibliometric and bibliographic information related to reading comprehension studies in the last decade. In the period of 2013-2022, publication trend of reading comprehension studies slightly increased while citation trend on the documents regarding reading comprehension skills tends to fall sharply. The productive and influential documents, authors, countries, institutions, and sources contribute most to the development of reading comprehension skills. Moreover, a lot of authors and institutions in the world jointly work and also generate research networking in conducting the studies of reading comprehension skills, mainly authors come from United States and educational institutions located in United States. Additionally, at least there are several major emerging themes related to reading comprehension studies such as methodology, language, educational level, reading disability, reading intervention, predictor of reading comprehension, and moderating factor of reading comprehension.

Many textbooks used to treat reading comprehension skills apply English, Chinese, Arabic, and Spanish whereby this indicates that the use of Indonesian as a language in textbooks to train reading comprehension skills has mostly not been applied. It means that researchers in the field of Indonesian language education can focus on the utilization of Indonesian textbooks in investigating learners' reading comprehension skills. Moreover, the researchers can develop innovative and effective reading interventions such strategy, approach, and instruction to enhance learners' reading comprehension skills, specifically reading interventions for the learners who have the disability to read the textbooks. Additionally, some other potential factors of reading comprehension skills such as ethnicity, culture, geographical location, and textbook topic can be investigated by the researchers to examine their role in moderating the enhancement of reading comprehension skills.

This study only involves the Scopus as the scientific database to search the documents related to reading comprehension studies. Even though the Scopus is one of the scientific databases which have the large well-qualified documents, but these documents have not represented the certain field regarding learners' reading comprehension skills. Therefore, this study suggests to involve other scientific databases which also have numerous well-qualified documents such as Web of Science and MDPI. In addition, this study only uses co-word analysis to synthesize the mainly emerging theme of reading comprehension studies in the last decade. Meanwhile, there are other analyses such as co-citation analysis and bibliographic coupling that can enrich findings of the mainly emerging theme of reading comprehension studies. As a consequence, the involvement of some analyses such as co-citation analysis and bibliographic coupling is needed to enrich co-word analysis.

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