


Bibliometric Analysis of Research in Digital Literacy using Google Scholar Database from 2017-2021

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Abstract—Bibliometrics is an analytical technique that functions as a communication tool for quantitative results. The theme of this bibliometric research is Digital Literacy. Digital literacy is the knowledge and skills of users in utilizing digital media. Technological developments are in line with the times, so digital literacy needs to be improved. This study use a bibliometric approach with a 5step method, there are 1) determining search keywords, 2) initial search results, 3) narrowing search results, 4) compiling statistics, and 5) analyzing data. There are 5 variables in this study, year of publication, keyword mapping, number of authors, author mapping, and citations. The results obtained are 999 articles with “digital literacy or digital literacies” as the theme in the Google Scholar database 2017-2021. The results of the data that have been analyzed, then mapped using the VosViewer application. The data for the trend of the most article titles was obtained, 249 articles in 2018. A total of 398 articles were written by a single author with the most influential authors being Castek, J. The keyword trends used in 2017-2021 are “digital literacy”, “information literacy”, “media literacy”, “information”, and “chapter”. Of the 999 articles, the title “The relation between 21st century skills and digital skills: A systematic literature review by the authors E. Van Laar, A. J. A. M. Van Deursen, J. A. G. M. Van Dijk, Jos de Haan which has the most citations, 873 citations.

Keywords: Bibliometric Analysis, Digital Literacy, Google Scholar, VOSviewer

1. INTRODUCTION

Bibliometrics is a branch of information science that was first used by Alan Prichard in 1969 (Eliwa et al., 2019). Bibliometrics serves as a communication tool in the application of mathematical and statistical methods. Alan Prichard in Shah (2016) uses bibliometric studies as a qualitative analysis in communicating quantitative results from bibliographic details such as authorship, year of publication, citations, images and graphics in the text. According to Tsay (2011) bibliometric technique is a technique for communicating statistical results from various articles. For example, citations in articles can be used as a map of relationships between articles. From a citation analysis study, one can find out their educational background, which journals are cited more often, who frequently cites those journals, etc. The results of citation analysis are used for many purposes, for example to determine the impact of a particular article or journal, and to document the interdisciplinary application of various journals (Desai, 2003).

Basically bibliometric analysis is an analytical technique that involves the process of collecting, calculating, analyzing and interpreting a quote taken from various types of literature (Shah, 2016). Bibliometrics helps to observe the growth of the literature and current research trends (Eliwa et al., 2019). According to Nani (2018), bibliometric analysis consisting of the number of publications, citations, authors, and other quantitative indicators can be used as communication between research groups. Basically, bibliometric analysis uses descriptive statistics. The purpose of bibliometric analysis is that it can be used to document “topographical” trends in science (Hallinger

& Kovačević, 2019). Bibliometrics does not analyze science itself but quantitatively analyzes the properties of that science (Alagu & Thanuskodi, 2019).

Research on bibliometrics has been carried out by several researchers in various countries. Alagu and Thanuskodi (2019) from India, conducted a bibliometric study that aims to assess the results of research with the theme “Digital Literacy” during the period 1992-2011, data was collected using the Histcite Software application. The variables used in this study are digital literacy research publications, influential countries, authors, published journals, language used, journal institutions, keywords, and citations. The data obtained are 512 articles of 126 articles were published in 2011, and the Journal of Adolescent & Adult Literacy journal occupies the first position with 18 records. Then, there is (Ha et al., 2020) from Vietnam who conducted a research entitled “A Bibliometric Review of Research on STEM Education in ASEAN: Science Mapping the Literature in Scopus Database, 2000 to 2019”. This study uses bibliometric analysis to evaluate the scientific results of STEM education in ASEAN, indexed by the Scopus database for the period 2000-2019. The data obtained are 175 articles which show that research trends in this field have shown a significant increase in the last three years, the number of published is 67.43% of the collection. The author’s background comes from the top 10 universities and research institutes. Most of the articles were obtained using the Scimago database with journal quality Q3 and Q4.

In addition to other countries, bibliometric research is also carried out in Indonesia. Tupan, Rochani Nani Rahayu, Rulina Rachmawati (2018) examines the trend of research developments in instrumentation for the period 2006-2016. This study was analyzed using the VosViewer application and Microsoft Excel 2010. The results obtained are the highest growth development in the field of instrumentation occurred in 2014 as many as 310 published articles. The international publications that appear the most are in the journal Spine with the Universidade de Sao Paulo-USP institution. The country that contributed the most was the United States. Meanwhile, the most prolific authors are Yazici, M., Zhang, H.Q., and Aubin, C.E., with the most subjects being medicine and engineering. Based on VosViewer mapping, the co-word groups 5 clusters and the co-authors group 7 clusters.

The development of technology in the current era of globalization is very rapid, especially since the emergence of the Covid-19 disease outbreak. The Covid-19 outbreak has changed face-to-face teaching and learning activities to online. So it forces us to adapt to technology. Most people in Indonesia still have very little knowledge about technology. Therefore, it is necessary to increase digital literacy, especially in Indonesia. Bibliometric research can provide information on how much research is on digital literacy. There are several studies with the theme of digital literacy conducted by previous researchers. However, there has been no research with the theme of digital literacy in the 2017-2021 period. Therefore, a research was conducted with the theme ‘Digital Literacy or Digital Literacies’ which was then analyzed using Microsoft Excel and mapping using the VosViewer application. This study takes data from Google Scholar from 2017 to 2021.

2. METHODS

2.1 Research Design

This research is a research with bibliometric approach. The bibliometric approach is a research with a mechanistic approach that aims to find out current trends globally in a particular area. Bibliometrics are obtained from the output of the academic database. This study uses the method previously proposed by Tranfield et al. (2003) where in analyzing bibliometrics using 5 stages, including 1) determining search keywords, 2)

initial search results, 3) narrowing search results, 4) compiling statistics, and last 5) analyze the data. The following is a flow diagram of the steps of bibliometric analysis, presented in Figure 1.

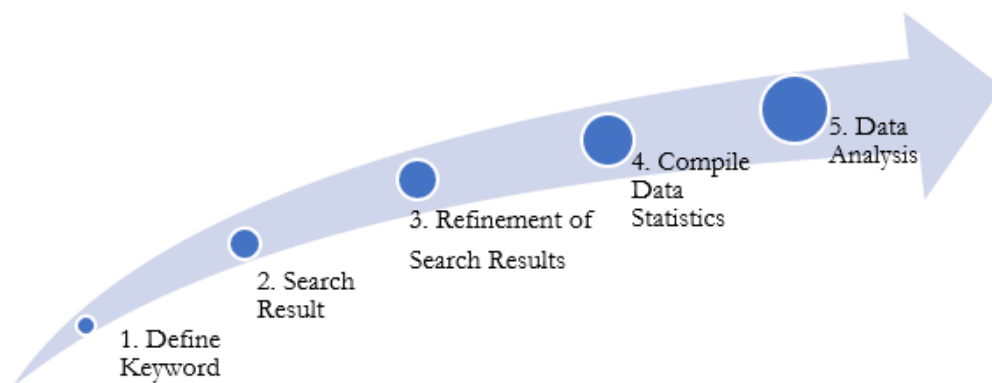


Figure 1. Bibliometric analysis steps

2.2 Define Keywords

The first thing to do is to determine keywords for bibliometric analysis materials. This research was conducted in October 2021 with the keywords 'Digital Literacy or Digital Literacies'. Data collection is based on a database from Google Scholar.

2.3 Search Results

This search was carried out using the Publish or Perish (PoP) application with specific searches for 'Journals', 'Title words', and 'Keywords' in the 2017-2021 period. The search results show that there are 999 articles that come from Google Scholar data.

2.4 Refinement of Search Results

At the stage of narrowing the search results by limiting the limit of search results. This research has a limit of 1000 articles and found 999 as bibliometric research metadata. The search results are then saved in ris format to include all article information such as article title, author, citation, keywords, publisher, article year, etc.

2.5 Compile Statistical Data

Compiling statistical data from the results of bibliometric research metadata can use the VosViewer software. This application is used as a tool or media that can visualize the data to be analyzed for mapping (Al Husaeni & Nandiyanto, 2022).

2.6 Data Analysis

The last stage is data analysis. The data we get is data from the VosViewer application where there will be 3 kinds of visualization options (density visualization, network visualization, and overlay visualization). This study used 5 scientific information, namely the year of publication, author mapping, number of authors, keyword mapping, and citations. Of the five perspectives used in this study, it can be explained briefly as follows:

- a) Year of publication: year of publication is the year in which the article was published.
- b) Keywords: keywords used in the article.
- c) Author Mapping: mentioning the authors who contributed as well as influential in the article.

- d) Number of Authors: knowing the number of authors per article.
- e) Citation: is the article that is most cited.

3. RESULTS AND DISCUSSION

This study discusses how to analyze the results of data mapping using the VosViewer application with the theme “Digital Literacy or Digital Literacies” in the Google Scholar database of 999 articles from 2017-2021.

3.1 Article Title Trends (Publication Year)

In Figure 2 it can be seen that the trend of article titles with the theme “Digital Literacy or Digital Literacies” in the 2017-2021 period was the most in 2018 with a percentage of 24.92% or 249 articles that have been published. Meanwhile, in 2021 it has the least percentage with a total of 8.7% or as many as 87 articles that have been published. This is because the data collection was carried out in October 2021 so that the existing data was not complete. It is possible that articles with the theme “Digital Literacy or Digital Literacies” will continue to grow. The results of this study differ from the results of research conducted by Caldevilla-Domínguez et al. (2021). In previous research, articles obtained from 2017-2020 had a significant increase. This is because, the theme of data collection is different. Research by Caldevilla-Domínguez et al. (2021) takes data with the theme “Digital Literacies” or “Higher Education”.

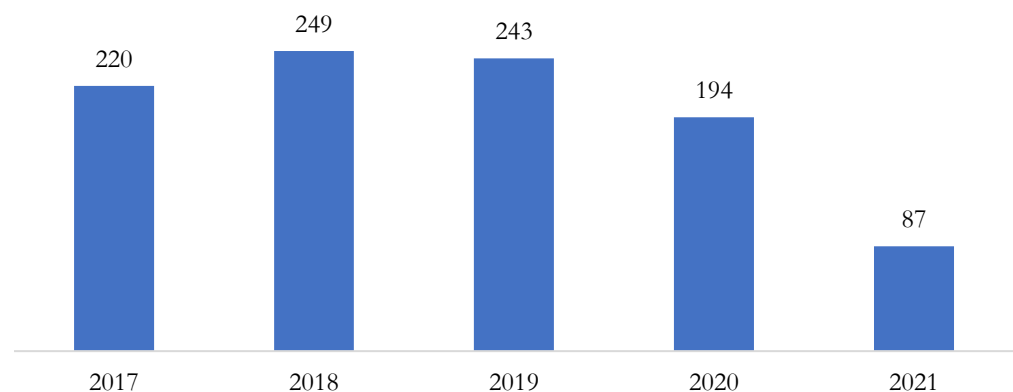


Figure 2. The number of publications by year

3.2 The Use of Keywords in Title

The visualization display of keyword trends with the theme “Digital Literacy or Digital Literacies” in 2017-2021 can be seen in Figure 3 with density visualization and in Figure 4 with overlay visualization. In Figures 4, it can be seen that the most frequently searched keywords are keywords with large and bold writing. The following are the 5 most frequently searched keywords based on Figure 4, namely “digital literacy”, “information literacy”, “media literacy”, “information”, and “chapter”.

3.3 The Most Influential Authors on Articles

The author’s bibliographic relationship is presented in Figure 5 with an overlay visualization. The author with the highest number of publications, number of citations, and link strength is Castek, J.

Each article has a different number of authors, from 999 articles that have been obtained there are 398 articles with 1 author, 287 articles have 2 authors, 182 articles have 3 authors, 98 articles have 4 authors, and 31 articles have 5 authors, and 3 articles have the highest number of authors, namely 6 authors. Out of 999 articles none has more than 6 total authors. The complete number of authors for each article can be seen in Figure 6 below.

Alagu & Thanuskodi (2019) conducted a research with the theme “Digital Literacy” for the period 1992-2011. The results showed that the most influential author was Hargittai E., and had the largest number of authors, namely single author with 228 articles. The research of Alagu & Thanuskodi (2019) is different from this re-search because the year of data collection is different. Previous research took data in 1992-2011 while this study took data in 2017-2021.

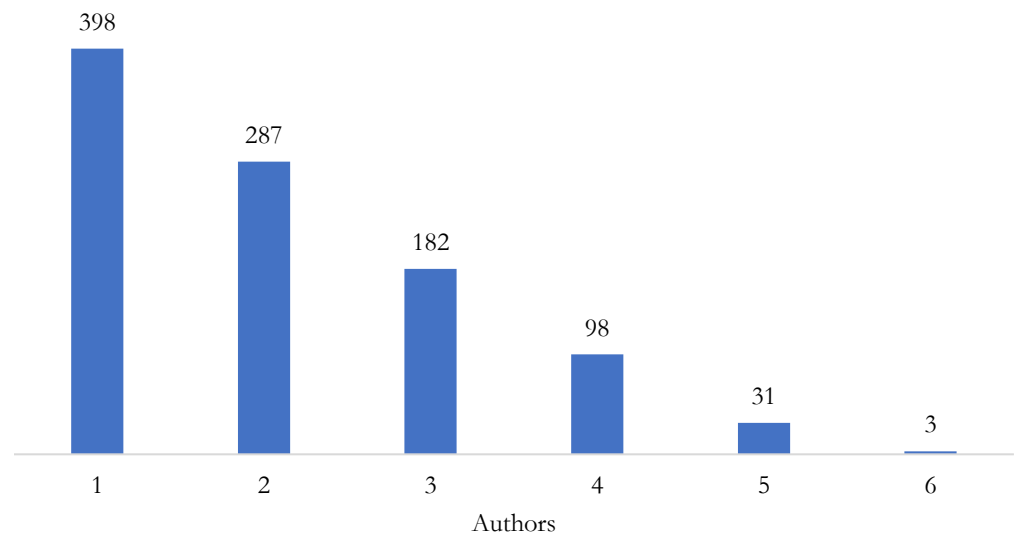


Figure 6. The Number of authors for each article

3.4 The Most Influential Citation

The following table contains the 10 most citations from 999 articles.

Table 1. Most Influential Citations

Rank	Citations	Authors	Title
1	873	Van Laar, E., Van Deursen A. J. A. M., Van Dijk, J. A. G. M., Jos de Haan	The relation between 21st-century skills and digital skills: A systematic literature review
2	689	Donald J. L., Charles K. K., Coiro, J., Castek, J., Henry, A. L.	New literacies: A dual-level theory of the changing nature of literacy, instruction, and assessment
3	560	Jones, R. H., Hafner, C. A.	Understanding digital literacies: A practical introduction

Rank	Citations	Authors	Title
4	333	Mihailidis, P., Viotty, S.	Spreadable spectacle in digital culture: Civic expression, fake news, and the role of media literacies in “post-fact” society
5	283	Cronin, C.	Openness and praxis: Exploring the use of open educational practices in higher education
6	206	Spante, M., Hashemi, S.S., Lundin, M., Algers, A.	Digital competence and digital literacy in higher education research: Systematic review of concept use
7	191	Hartley, J.	The uses of digital literacy
8	190	Cooke, N.A.	Posttruth, truthiness, and alternative facts: Information behavior and critical information consumption for a new age
9	189	Potter, J., McDougall, J.	Digital media, culture and education: Theorising third space literacies
10	182	Marsh, J., Hannon, P., Lewis, M., Ritchie, L.	Young children’s initiation into family literacy practices in the digital age

According to Table 1, it can be seen that the number of citations from 999 articles revealed that the most citations were 873 citations in journals with the title ‘The relation between 21st century skills and digital skills: A systematic literature re-view’ by authors E. Van Laar, A. J. A. M. Van Deursen, J. A. G. M. Van Dijk, Jos de Haan the increase in citations over the 5 years analyzed comes from Elsevier. There are differences in the results with the research conducted by Alagu & Thanuskodi (2019). Previous research, obtained 20 most influential citations, one of which is the author Cazden C in 1996 with 31 articles. This difference is due to the different years of data collection. Previous research took data for the period 19922011, while this study took data from 20172021.

4. CONCLUSION

There are 999 articles with the theme “Digital Literacy or Digital Literacies” in the Google Scholar database in 2017-2021. The results of the data that have been analyzed are then mapped using the VosViewer application. The data obtained from the trend of the most article titles, namely 249 articles in 2018. A total of 398 articles were written by a single author with the most influential author being Castek, J. The trend of keywords used in 2017-2021, namely “digital literacy”, “information literacy”, “media literacy”, “information”, and “chapter”. Of the 999 articles, the title ‘The relation between 21st-century skills and digital skills: A systematic literature review’ by the authors E. Van Laar, A. J. A. M. Van Deursen, J. A. G. M. Van Dijk, Jos de Haan which has the most citations, 873 citations.

5. LIMITATIONS AND RECOMMENDATIONS

This research provides direction for future educators and researchers for further Digital Literacy studies. It is hoped that this research can provide insight to readers, especially educators. There are limitations in this study. First, the current research is limited to journal articles related to Digital Literacy published in the Google Scholar database. So it supports different results with other databases. Note that editorial sections, comments, book chapters, book reviews, etc., are not included for analysis. Then, it should also be noted that the current research is limited in terms of time span.

Based on the limitations mentioned above, the researcher suggests that more types of articles be included and for a longer period of time. It is intended to provide more views on Digital Literacy.

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