Digital Media Literacy in Scholarly Discourse: A Bibliometric Analysis of Scopus-Indexed Publications

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Notes	ABSTRACT
  How to cite: Ahmad Riyadh Umar Bahlamar. (2024). Digital Media Literacy in Scholarly Discourse: A Bibliometric Analysis of Scopus-Indexed Publications. Khizanah Al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, Dan Kearsipan, 12(2). Retrieved from https://journal.uin-alauddin.ac.id/index.php/khizanah-al-hikmah/article/view/47103 DOI: 10.24252/kah.v12i2a3 	This study employed bibliometric analysis to examine research developments and identify emerging topics in digital media literacy, utilizing data from the Scopus database spanning 2018–2024. The analysis aims to uncover trends, highlight key contributors, and explore gaps in the existing literature. Data were analyzed using VOSviewer and Biblioshiny software to map research productivity, citation patterns, and collaborative networks. The study revealed a steady annual increase in publications on digital media literacy, with the highest average citation rate observed in 2020. The United States leads in both publication output (1,547 articles) and citation impact (5,422 citations), followed by Spain, Indonesia, and Australia. Prominent contributors in the field include Garcia-Ruiz, Rosa; Romero-Rodriguez, Luis M.; Aguaded, Ignacio; and Perez-Rodriguez, Amor, who have significantly shaped collaborative networks. Keyword analysis identifies recurring themes such as "digital literacy," "COVID-19," and related concepts, reflecting the field's responsiveness to global challenges and its evolving focus. This study underscores the increasing scholarly attention to digital media literacy and highlights opportunities for future research, including addressing interdisciplinary gaps and fostering international collaboration to further advance the field. **Keywords:** Digital media literacy; bibliometric; Scopus, research trends; VOSviewer; Biblioshiny

1. INTRODUCTION

The rapid development of information and communication technology has brought the global community into the digital age (Lolitha & Nadira, 2023; Rasi et al., 2019), social change (Hilbert, 2020), digital economic interactions and innovation in the world of education (Kara, 2019). The use of digital devices, such as smartphones and computers, as well as widespread access to the internet, has changed the way individuals access, share and produce information (Lewin et al., 2021; Morieson, 2021). However, as more information becomes available, the ability to sort and critically understand digital content becomes increasingly important. Digital media literacy has

emerged as an urgent need, given the potential positive and negative impacts that unwise use of digital media can have (Milenkova & Lendzhova, 2021).

Despite widespread access to technology and information, many individuals still lack adequate digital media literacy skills. This is characterized by the high rate of hoaxes, lack of awareness about digital privacy, and lack of understanding about ethics in using social media (Mrah, 2022; Elmore & Coleman, 2019; Moaswes, 2019). This challenge is not only faced by the general public, but also by certain groups such as students (Yue et al., 2019), working professionals, and parents, who play an important role in shaping public opinion and digital behavior patterns (Lv, 2022; Maqsood & Chiasson, 2021; van Laar et al., 2020).

Lack of digital media literacy has far-reaching impacts, both socially and economically (Obar & Wildman, 2015). In the social context, low digital media literacy can lead to disinformation, community polarization and even radicalization. On the economic side, the inability to utilize digital technologies effectively can reduce an individual's competitiveness in a job market that increasingly relies on digital skills (Oktaviyani et al., 2023). Low digital literacy can also hinder innovation and participation in the growing digital economy. In addition, low digital media literacy also makes it easier to fall victim to digital crimes, such as scamming, hacking, phishing, carding, online fraud, data manipulation and many others (Park et al., 2021; Alzubaidi, 2021; (Gita & Cevi, 2023).

In Indonesia, the growth of internet penetration shows a concerning social condition, as shown in Figure 1. Where internet users in Indonesia reached 77.02 percent. This means that 213 million people out of Indonesia's total population (276.4 million) are connected to the internet. The data highlights the increase in cybercrime cases along with the increase in internet usage, with more than 5,000 reported cases. This increase in cybercrime is due to the low level of digital literacy (Gita & Cevi, 2023; Alzubaidi, 2021). According to Program for International Student Assessment (PISA) data, Indonesia was among the ten countries with the lowest literacy levels in 2019 (DPR RI (2023); Ismawati et al., 2023). This reflects people's reluctance to read, despite the unstoppable flow of information. As a result, Indonesians remain vulnerable to various online threats such as fraud, hacking, phishing, carding, online scams, data manipulation, hate speech, and fake news.
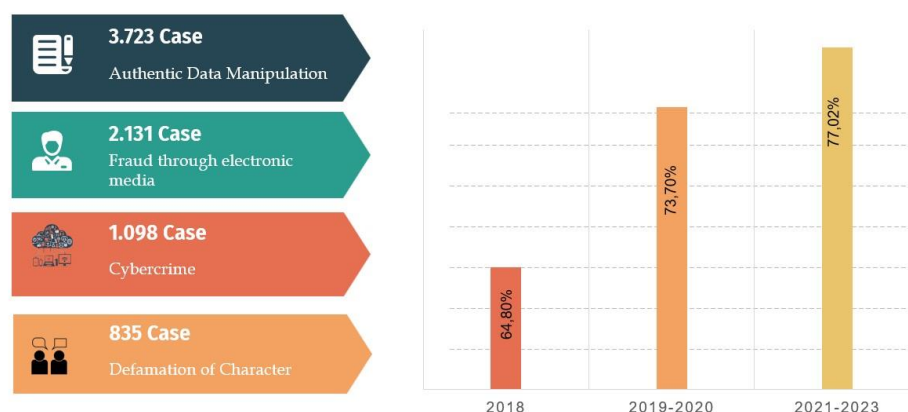

Figure 1. Data on cyber crime and internet penetration in Indonesia

The increase in digital crime indicates that a person's ability to literate in digital media is at a low level. Improving this ability requires special and sustained attention (Setyaningsih & Utama, 2021). One way to improve digital media literacy is to collect information related to the

impact, influence, relationship and development of digital media literacy (Tinmaz et al., 2022). Collecting this information can be done through bibliometric analysis. Because bibliometric analysis is able to integrate various information globally and locally. So that the information that has been collected can create a more comprehensive and innovative solution, which can then be adopted in government policy in a country. The current study employed bibliometric analysis to examine research developments and identify emerging topics in digital media literacy, utilizing data from the Scopus database spanning 2018–2024. The analysis aims to uncover trends, highlight key contributors, and explore gaps in the existing literature.

2. METHODS

This research used a quantitative approach to bibliometric analysis. Figures in bibliometric function as statistical figures that can evaluate the growth trend of publications and authorship of researchers with the same research theme (Oktaviyani et al., 2023; Caldevilla-Domínguez et al., 2021; Kusnali et al., 2023). The data in this article were obtained from the Scopus database, where the Scopus database was chosen as the main data. Because Scopus has the largest data coverage. In addition, the reputation of Scopus is very high and internationally recognized. The information provided is also complete. Such as abstracts, keywords, and references that are very useful for various types of bibliometric analysis (Rachmanillah et al., 2022). The quality of data indexed in Scopus has also gone through a rigorous selection process, and this is an important aspect of accurate and valid bibliometric analysis (Baas et al., 2020).

Similarly, the study applied a comprehensive set of software tools to conduct quantitative research by visualizing the collected literature. The tools used were R-version 4.4.1, VOSviewer (version 1.6.20). These two tools are known to process large data sets and visualization networks and can estimate trends that can be explored and presented in-depth related to digital media literacy. VOSviewer is a set of software tools capable of analyzing large amounts of data and is able to provide excellent network mapping (Bukar et al., 2023). It is used to explore and visualize collaboration between countries through networks, and visualize in density the countries with the most article production. While Biblioshiny is a tool that functions in generating annual analysis of scientific production, authors and the most productive countries (Rashid, 2023; Aria & Cuccurullo, 2017). In this study, biblioshiny is used to determine the publication trend of digital media literacy articles, describe the most article production countries and the most cited country information and so on.

To meet the objectives of this study, bibliographic data was retrieved from the Scopus database, covering the period from 2018 to 2024. It then filtered the data and only selected the article data type. The collected data was pulled into a Microsoft Excel Comma Separated Values (.csv) format. Then processed using VOSviewer and Bibliometrix Biblioshiny which is then used to analyze to obtain information. More details can be shown through the flowchart below:
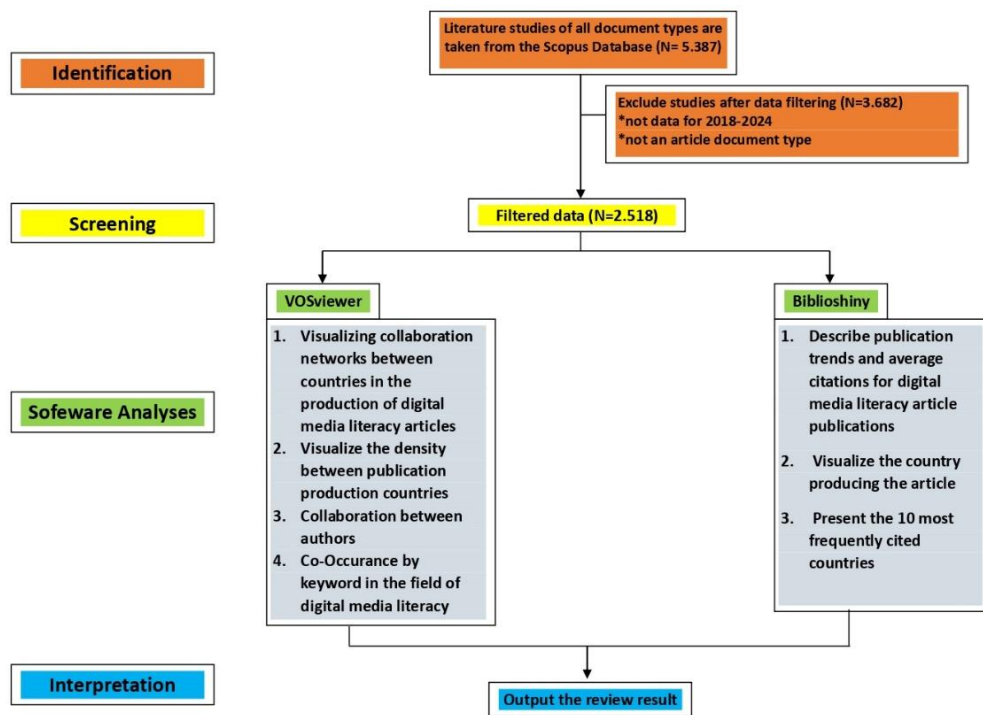
Figure 2. Flowchart of Data Collection in Digital Media Literacy Research

3. RESULTS AND DISCUSSION

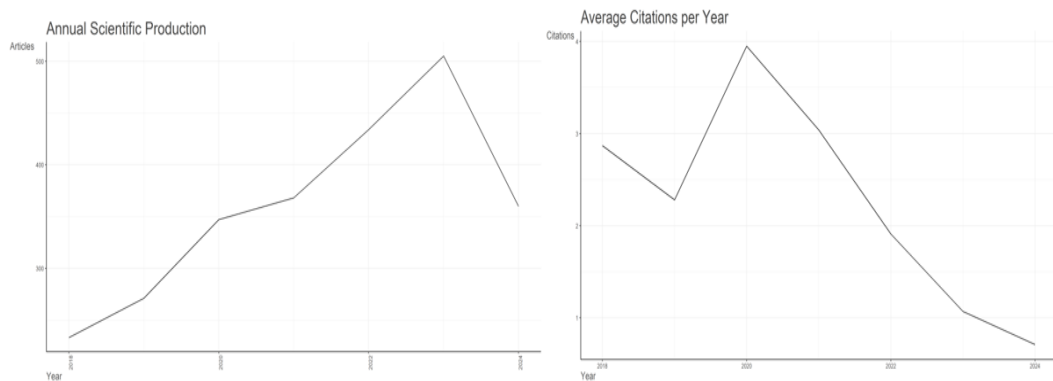### Publication and Citation Trends in the field of Digital Media Literacy

Figure 3. Visualization of publication trend and trend average citations in digital media literacy 2018-2024 using Bibliometrix Biblioshiny

	Total Publications	Total Average Citations

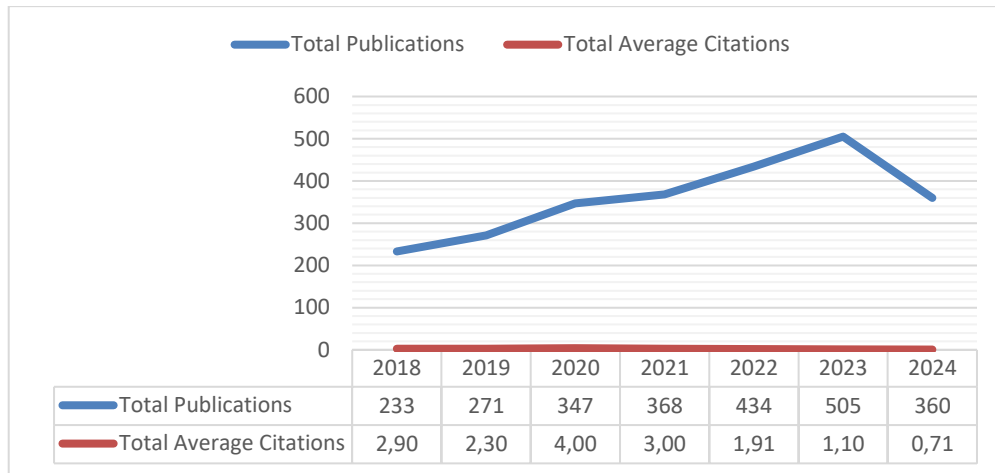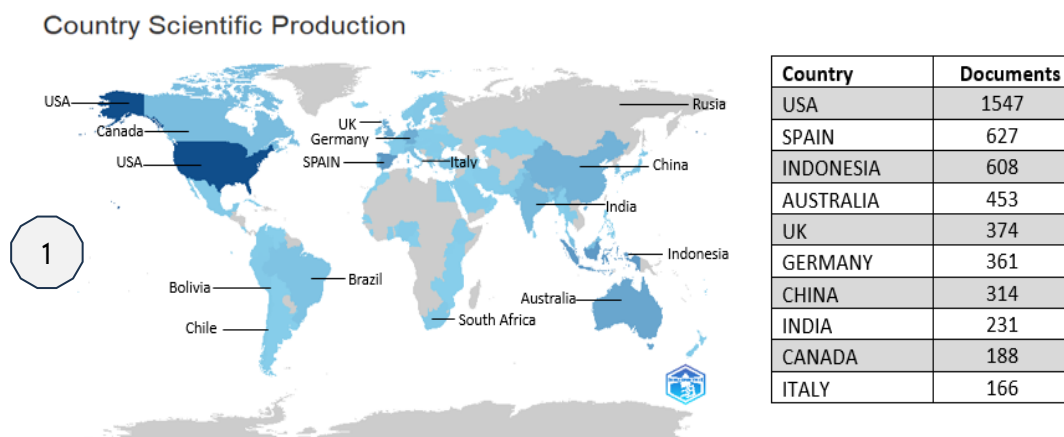|	2018	2019	2020	2021	2022	2023	2024
Total Publications	233	271	347	368	434	505	360
Total Average Citations	2,90	2,30	4,00	3,00	1,91	1,10	0,71

Figure 4. Comparison of total publications with total average citation of digital media literacy articles 2018-2024

In Biblioshiny, it has the option to download data and see an overview of annual scientific production as well as average citations per year (Lim et al., 2024). The scientific production of digital media literacy in the Scopus database for 2018-2024 can be shown in Figure 3. The figure displays the visual trend of digital media literacy data as well as the average citations per year. However, it has a shortcoming, namely the absence of more specific information, for example, the display of numerical data. Whereas the numerical data can be used to know the exact number of articles published and their citations clearly.

Based on this analysis, the researcher provides a more comprehensive visualization of the trend, as illustrated in Figure 4. The figure reveals that in 2018, 233 articles were published, with an average of 2.9 citations per article. In 2019, although the number of articles increased to 271, a decline in average citations was observed. Notably, there is a significant rise in the production of articles on digital media literacy, which is not reflected in a corresponding increase in citations. This discrepancy could be attributed to uneven citation practices, where established sources are preferentially cited while newer articles are overlooked.

Most productive and most cited countries in the field of Digital Media Literacy

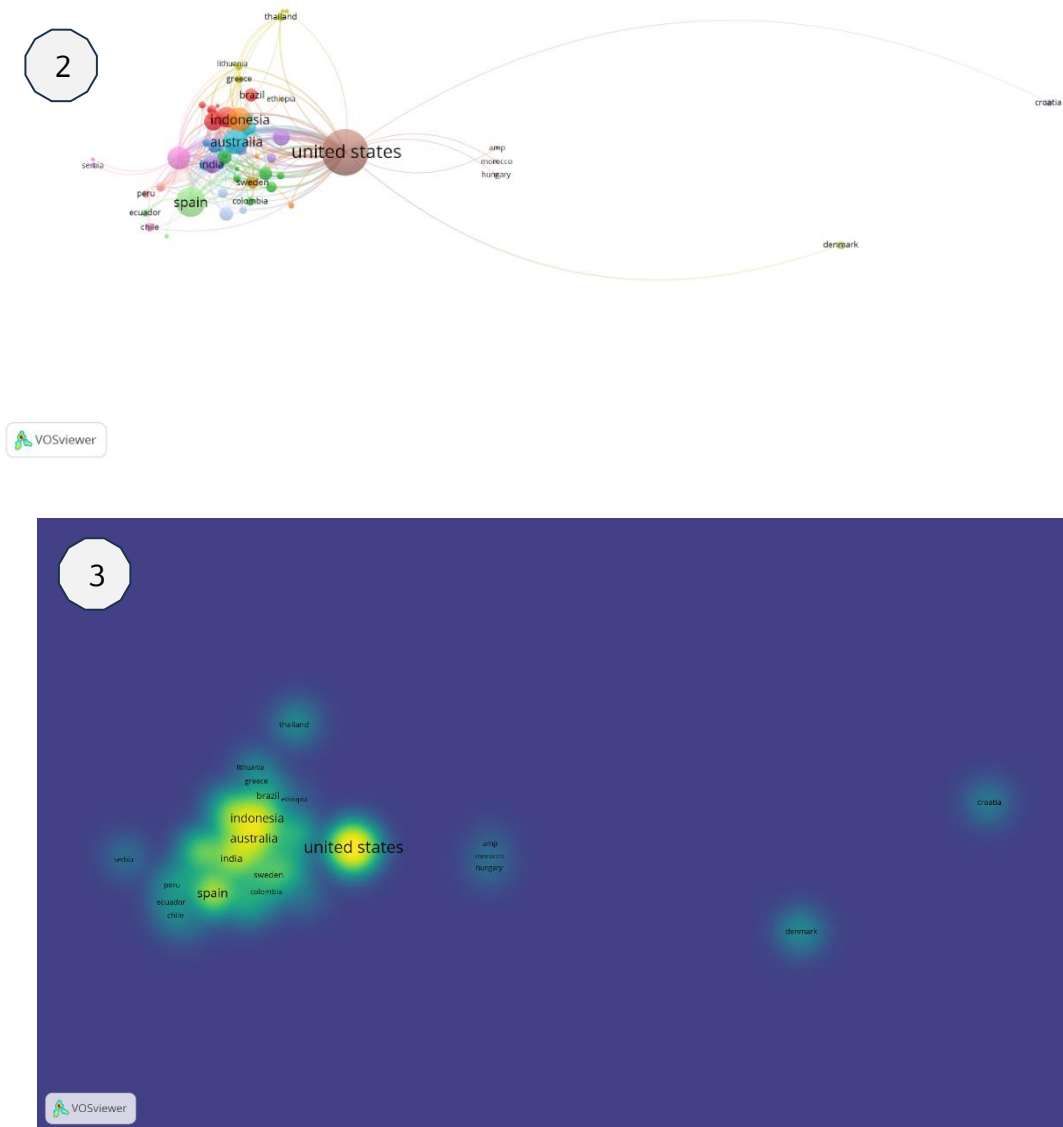| Country	Documents
USA	1547
SPAIN	627
INDONESIA	608
AUSTRALIA	453
UK	374
GERMANY	361
CHINA	314
INDIA	231
CANADA	188
ITALY	166

257

Figure 5. Research contributions and partnerships between countries/regions in the field of digital media literacy. (1) Geography of digital literacy article production between countries. (2) Collaboration networks between countries/regions with at least three publications. (3) Visualization of the density of top countries with the highest number of citations.
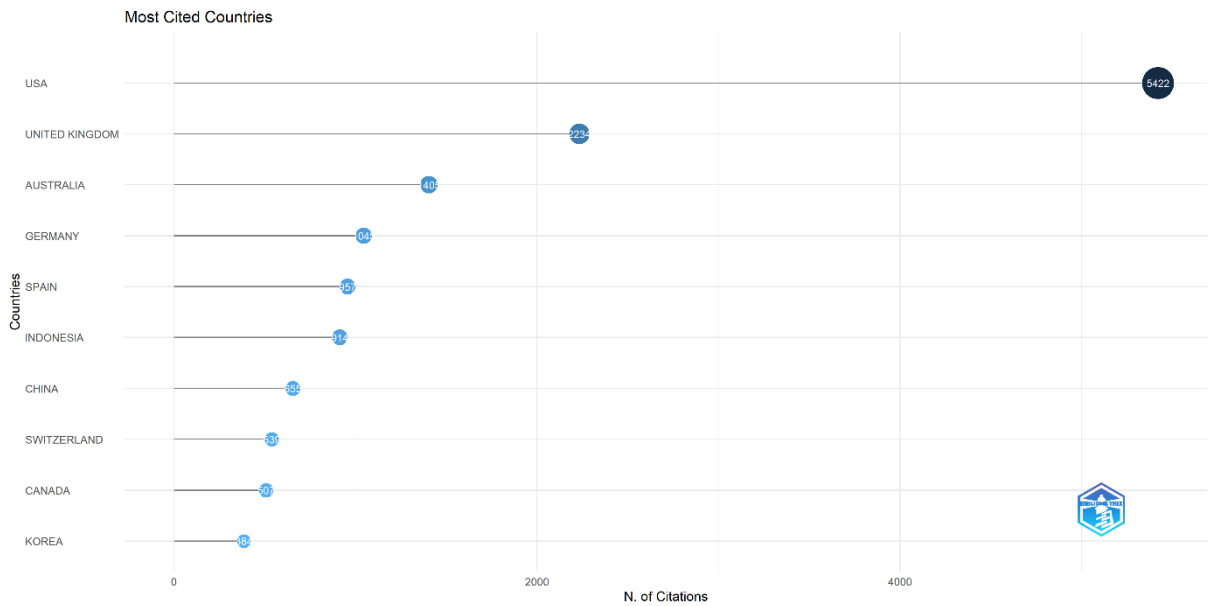
Figure 6. Top ten countries by citations using Bibliometrix Biblioshiny

Table 1. Top ten countries by citations and citations publications

No	Country	Citations	Citations Publications
1	USA	5422	13,2
2	United Kingdom	2234	21,1
3	Australia	1405	11,9
4	Germany	1045	11,7
5	Spain	957	8,3
6	Indonesia	914	7,6
7	China	655	7,4
8	Switzerland	539	41,5
9	Canada	507	9,6
10.	Korea	384	11

Source: Processed using Bibliometrix Biblioshiny

Figure 5(1) shows that there are ten countries that publish the most articles related to digital media literacy. The deeper the blue color indicates that the country is the most frequently published country. If you look at Figure 5(1), the country with the deepest blue color is the USA with 1547 articles. This is followed by SPAIN, Indonesia, Australia, the UK, Germany, China, India, Canada and Italy.

The strength of the connections can be shown visually through the network in Figure 5(2). Figure 5(2) shows that the United States is the center point for other countries in digital media literacy research. Where the United States is associated with Indonesia with 608 articles published, Australia with 453 articles, India with 231 articles, SPAIN with 627 articles and followed by other countries. The strength of the United States as the most influential country in digital media literacy research or articles is also shown in Figure 5(3), namely density visualization using Vosviewer, where the United States has a very strong brightness level followed by Indonesia, Australia, India, SPAIN and other countries. In addition, there are ten countries with the most cited shown in Figure 6. With a total of 5422 citations, the USA outperforms other countries very significantly. The United Kingdom followed with 2234

citations, while in third place was Australia with 1405 citations. In terms of citations publications (CP) as shown in Table 1, Switzerland leads with a score of 41.5, trailed by United Kingdom (21.1), USA (13.2), Australia (11.9), Germany (11.7), Korea (11), Canada (9.6), Spain (8.3), Indonesia (7.6) and China (7.4).

Visualization of Author Collaboration Based on Keywords in the field of Digital Media Literacy

The description of author collaboration in bibliometric analysis refers to how authors or researchers work together in producing scientific publications. This analysis involves identifying and measuring relationships between authors. Such as collaboration networks that are used to look at the network structure of the authors of the number of joint publications, home institutions, or disciplines. Analyzing Co-authorship is useful for knowing the frequency and pattern of cooperation between authors in producing scientific articles. In this study, the data shows there are 7025 authors related to digital media literacy publications. To increase relevance and identify collaboration more specifically, we filtered out only 2 eligible authors of digital media literacy publications. This resulted in only 525 of the 7025 authors meeting the threshold. The visualization of the 525 authors can be described as follows:
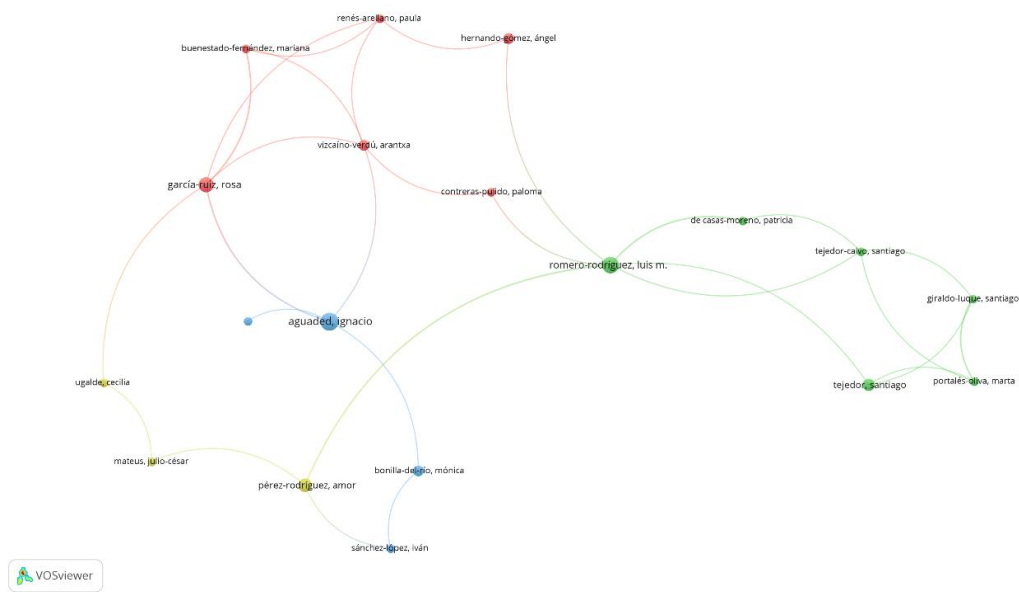

Figure 7. Author collaboration in digital media literacy 2018-2024

Figure 7 is a visualization of the author collaboration network based on co-authorship analysis using VOSviewer software. The important elements visible in the figure are the author nodes. Each node or point in this network represents an author who contributed to a particular publication. The size of the nodes can reflect the number of publications or author contributions in the network. Authors with larger contributions have larger nodes. These nodes are grouped by different colors, which indicate clusters or groups of authors who often work together on their research. The colors red, green, blue, and others indicate that there are several clusters of authors that are closely related. The lines connecting the nodes indicate collaboration between the authors. The thicker the line, the more often the two authors collaborate.

As depicted in Figure 6, digital media literacy research from 2018 to 2024 is organized into four distinct clusters, represented by the colors red, green, blue, and yellow. Cluster 1 (red) is centered around Garcia-Ruiz, Rosa; Cluster 2 (green) around Romero-Rodriguez, Luis M; Cluster 3 (blue) around Aguaded, Ignacio; and Cluster 4 (yellow) around Perez-Rodriguez, Amor. Each central author plays a pivotal role in shaping research collaboration within their respective clusters.

Interestingly, among these central figures, only Garcia-Ruiz, Rosa and Aguaded, Ignacio exhibit a close collaborative relationship. However, their connection does not extend to other central authors. Instead, interactions across clusters are mediated by secondary authors who are not corresponding authors, highlighting a more fragmented network of collaboration beyond the central figures.

The next focus of this research was to examine co-occurrence patterns using the keyword digital media literacy. Co-occurrence analysis in bibliometric studies was employed to identify the relationships and interconnections among keywords, providing valuable insights into the knowledge structures and thematic patterns within the scientific literature. The following presented an overview of the co-occurrence network for the keyword digital media literacy.
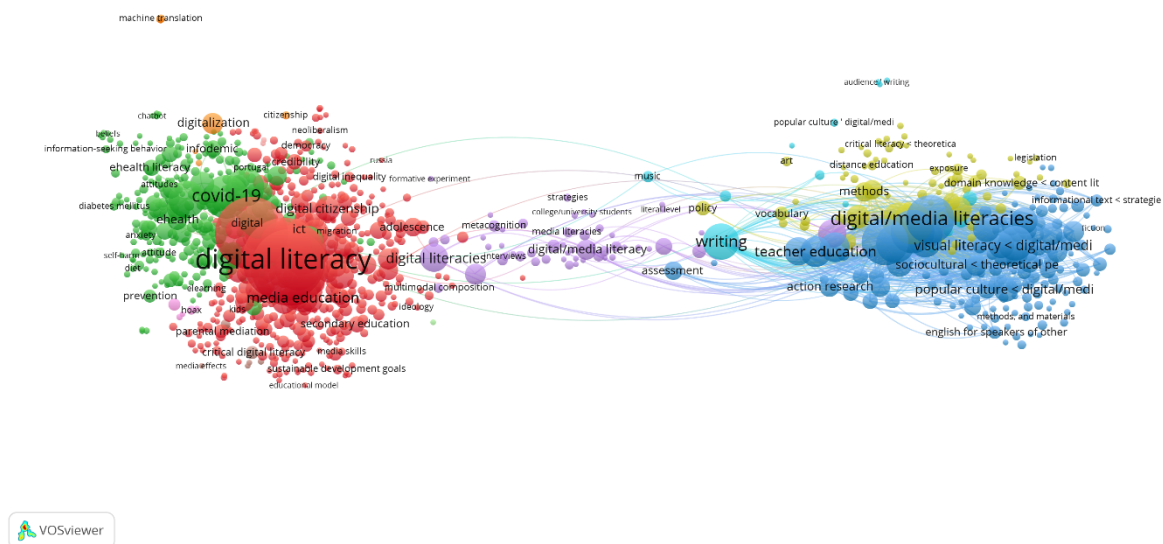

Figure 8. Co-occurance by keywords digital media literacy 2018-2024

Figure 8 displays a network map that shows the relationship of various keywords that often co-occur in the analyzed documents on digital media literacy. Each node represents a particular keyword. The larger the node, the more frequently the keyword appears in the Scopus dataset. The lines connecting the nodes show the frequency with which the keywords co-occur. The thicker the line, the stronger the relationship between the two keywords (Shang et al., 2021).

The nodes in the figure are grouped by different colors, which indicate clusters or groups of interrelated research themes. Different colors represent different topics or major themes identified in this analysis. In this study, as shown in Figure 8, there are dominating colors, namely red, which represents the theme of "Digital Literacy". Green nodes are represented by themes related to "Covid-19." Blue nodes are represented by the theme "digital/media literacies."

The number of digital media literacy article publications has increased every year (as shown in Figure 3 and Figure 4). This indicates a growing interest in digital media literacy and this may be due to the development of technology, which makes individuals have a great interest in the impact it has on the ability of individuals to literate digital media (Haleem et al., 2022; Tetep & Suparman, 2019; McDougall et al., 2018). Where literacy and digital media are a complete package needed in the current reform era, with proficient literacy skills, individuals can minimize all negative impacts caused by digital media.

Not only that, through competent digital media literacy skills, a person can receive correct information and avoid hoax information that quickly spreads in the community, as happened during the Covid-19 pandemic. During the Covid-19 pandemic, digital media became the main tool for obtaining information (De' et al., 2020; Wong et al., 2021). This is because, in that condition, people have limitations in activities (Tejedor et al., 2020; Dewi, 2022). Conversely, someone who does not have digital literacy skills will experience anxiety that can affect their health (Dunham et al., 2020). Therefore, documents related to digital media literacy articles are needed.

In the range of 2018-2024, the USA became the country that published the most articles related to digital media literacy, which is around 1547 articles. This makes the USA the most productive country regarding digital media literacy publications. Not only that, the USA is also the country with the most citations, which amounted to 5422 citations. This number of citations is greater when compared to Spain, Indonesia and other countries. One of the reasons is that many authors have strong connections with institutions in the USA or are based in the USA. (Wang et al., 2020; Zhao et al., 2018)

Such as the author named Romero-Rodriguez, Luis M., is known for his contributions to the field of digital media literacy, especially in the Ibero-American region. It is therefore not impossible for Romero-Rodriguez, Luis M to be one of the central authors in his cluster (as shown in Figure 5). "Romero-Rodriguez, Luis M" plays an important role in the digital media literacy collaboration network with the author named "García-Ruiz, Rosa". They are connected to each other through other writers. This shows that they actively collaborate and have significant influence in the field of digital media literacy research (Aguaded et al., 2020).

While "Romero-Rodriguez, Luis M" and "García-Ruiz, Rosa" play important roles, there are also writers in small clusters who show their strengths by collaborating with other clusters. This group looks solid and collaborates intensely with each other. Like Mateus, Julio-Cesar; Tejedor-cavo, Santiago; Sanchez-lopez, Ivan and Renes-arelano, Paula Julio - César Mateus appears to have fewer connections in the network. This means he works in a smaller, more focused group, or has a very specific research focus. Usually, these authors are new to the network and have more specialized research (Leydesdorff et al., 2019).

Understanding the structure of collaborations through bibliometric analysis can help in identifying opportunities for new collaborations or detecting researchers who have the potential to become leaders in their field (Fauziah et al., 2023). In addition, these networks can evaluate the effectiveness of collaborations and determine areas where collaborations can be strengthened (Zou et al., 2022), as shown in the Co-Authorship analysis network.

It's to be noted that an important insight generated through Co-Authorship analysis is about how researchers collaborate and how these networks might influence knowledge production in a particular field (Cao et al., 2023). For example, when authors want to collaborate on their research, the benefits are stronger links between different clusters; encouraging inter-

cluster collaboration; exploring the changing structure of collaboration over time; knowing the influence of individuals in the development of research and so on.

This co-authorship can be linked to others through shared author keywords. Similar keywords help in building research networks that can facilitate cross-disciplinary collaboration or the development of new theories as shown in the co-occurrence by keyword (Figure 6) in this study. Through the network in the figure, it can see that "Digital Literacy" is a central theme that is often associated with various other topics such as "COVID-19," "media education," and "digital citizenship." This means that many authors intersect with the keyword "Digital Literacy." Interpreted, Figure 6 shows the importance of education in discussions about digital media literacy.

Not only that, it seems that Covid-19 also has a strong relationship with the topic of digital media literacy (Wang & Si, 2023). Where in these conditions, many individual activities have shifted to the digital world (Samadbeik et al., 2022). This makes COVID-19 the most frequently discussed keyword in the world of research. At the same time, it provides information that research related to digital media literacy continues to develop and create different sub-themes.

4. CONCLUSION

The increasing number of articles published on digital media literacy over the years reflects the growing interest in the field. This study shows that the United States is the most productive country and has the greatest influence on digital media literacy, both in terms of number of publications and citations. In addition, the analysis of collaboration networks revealed several key authors who play an important role in the development of digital media literacy. Such as García-Ruiz, Rosa and "Romero-Rodriguez, Luis M. The collaboration demonstrated by García-Ruiz, Rosa and "Romero-Rodriguez, Luis M proves that there is an interesting dynamic and potential for stronger collaboration in the future with emerging themes in research related to digital media literacy. For example, through themes in education, media, and people's responses to digital media. Therefore, digital media literacy is a very dynamic field and has broad relevance, especially in the context of public policy development.

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