26 (1), 2025, 595-611

Jurnal Pendidikan MIPA

e-ISSN: 2685-5488 | p-ISSN: 1411-2531

http://jurnal.fkip.unila.ac.id/index.php/jpmipa/

Bibliometric Analysis of Research Trends in Digital Literacy within Indonesian Education: Development, Challenges, and Opportunities

Febrina Aulia*, & Elfi Tasrif

Faculty of Engineering, Universitas Negeri Padang, Indonesia

Abstract: Bibliometric Analysis of Research Trends in Digital Literacy within Indonesian Education: Development, Challenges, and Opportunities. Objective: The advancement of technology and the increasing reliance on internet-based communication demand digital literacy as an essential skill for technology users. The education sector plays a crucial role in building understanding, implementation, and reinforcement of digital literacy skills. Methods: This study conducts a bibliometric analysis of research trends in digital literacy within Indonesian education using articles indexed in the Sinta database. We found 548 articles and analyze it based on criteria. Finally, 431 articles match the criteria for this study. The search was not time-restricted, allowing the study to identify the earliest research on digital literacy in Indonesia. Findings: The analysis results indicate that research in this field began to be published in 2017 and has seen significant growth up to 2024. The majority of publications are found in journals accredited by Sinta 5, Sinta 3, and Sinta 4, with qualitative research being the most dominant methodology. Additionally, geographical distribution shows that Java Island contributes the highest number of publications. This study covers various educational levels, from early childhood to higher education, with varying contributions at each level. Conclusion: Research on digital literacy in Indonesian education has largely focused on pedagogical approaches, educational technology, and its effects on teachers and students. However, there is ample opportunity for further investigation, particularly in exploring digital literacy within specialized fields, its impact on students' academic and non-academic competencies, and its role in equipping students to be responsible and ethical members of the digital society. Furthermore, future research should extend its geographical coverage beyond Java to provide a more inclusive perspective on the development of digital literacy across diverse regions in Indonesia.

Keywords: bibliometric analysis, digital literacy, education, learning, Indonesia.

▪ INTRODUCTION

The rapid evolution of information and communication technology (ICT) has significantly transformed human life. The rapid development of digital technologies such as the Internet of Things (IoT) and artificial intelligence (AI) makes digital skills crucial for maximizing technology use to acquire new knowledge. Mastery of digital technology is an effective and efficient means of solving various social issues, improving societal quality of life, and ensuring sustainable economic growth (Fukuyama, 2018). This skill set is known as digital literacy.

Gilster defines digital literacy as the ability to understand and use information in various formats from multiple sources presented via computers (Tamborg et al., 2018). Digital literacy extends beyond device usage and website access; it also encompasses the ability to access, manage, comprehend, integrate, communicate, evaluate, and create information securely and appropriately using digital technology for employment, decent work, and entrepreneurship (Kementerian Komunikasi dan Informatika, 2024; UNESCO Institute for Statistics, 2018). Proficiency in digital literacy enhances critical thinking skills in processing information (Kementerian Komunikasi dan Informatika, 2024),

Febrina Aulia*, & Elfi Tasrif
*Email: febrinaaulia@student.unp.ac.id

DOI: http://dx.doi.org/10.23960/jpmipa/v26i1.pp595-611
Received: 22 March 2025
Accepted: 13 April 2025
Published: 06 May 2025

thereby minimizing misinformation and hoaxes (Brashier & Schacter, 2020), improving understanding and handling of cyberbullying (Fonseca & Borges-Tiago, 2023) Proficiency in digital literacy enhances the public's critical thinking ability in receiving information (Ministry of Communication and Informatics, 2024), thereby minimizing the occurrence of misinformation and the spread of hoaxes (Brashier & Schacter, 2020), improving understanding and management of cyberbullying (Fonseca & Borges-Tiago, 2023), as well as enhancing work capabilities and supporting the fulfillment of job requirements for the productive age population (Bejaković & Mrnjavac, 2020; Yang et al., 2025)

Research on digital literacy has undergone significant development since 2018, emerging from various academic disciplines, which gives this topic an interdisciplinary and integrative character (Yang et al., 2025). One of the disciplines that extensively discusses digital literacy is education. Digital literacy has become a critical issue in education due to the high urgency of mastering these skills in the digital era. This is evidenced by the fact that research trends in digital literacy in education focus on pedagogical practices in developing digital literacy (Yang et al., 2025) Research on digital literacy continues to evolve in order to understand trends, implications, and challenges across various sectors, especially in education. Bidang penelitian literasi digital terus berkembang, sehingga sangat penting untuk mengeksplorasi tema dan topik yang sedang berkembang agar tetap relevan dan inovatif (C. Wang & Si, 2023)

In Indonesia, numerous studies on digital literacy within education have been conducted, covering topics such as digital literacy in early childhood education (Asmayawati et al., 2024; Ika Sari et al., 2024), the development of learning models (Komarudin et al., 2024), and the impact of digital literacy on technology usage (Muawanah et al., 2024; Musyaffi et al., 2024). The variety of topics related to digital literacy in education in Indonesia indicates the need for an analysis of research trends. Such an analysis is crucial for mapping related topics in digital literacy within education in Indonesia and identifying research gaps that can be explored for future studies.

One method commonly used to analyze the development of a field is bibliometric analysis. Bibliometric analysis is a method that combines data mining and data visualization to evaluate scientific research and predict research trends within a specific field (Zhang et al., 2024). It analyzes large volumes of data to present an evolutionary overview of a particular field and identify emerging topics (Donthu et al., 2021)

Numerous researchers worldwide have conducted bibliometric analyses of digital literacy, exploring various perspectives such as data selection periods, data sources, educators' perceptions of digital literacy, and digital literacy in education.

Table 1. Bibliometric research on digital literacy

Author	Research Content
(Wu et al., 2024)	Bibliometric analysis of the evolution of digital literacy research based on the WoS Core Collection from 1990 to 2024. Education & educational research, health sciences & services, and public, environmental & occupational health are the top three research categories included in digital literacy studies.
(C. Wang & Si, 2023)	A bibliometric analysis of digital literacy research and the impact of the COVID-19 pandemic on this research. The study utilizes the Web of Science database.

(Lima Neto & Carvalho, 2022)	This paper discusses perceptions of digital literacy among teachers and academics through published articles. The findings indicate that digital literacy is often associated with the use of tools, while awareness in usage and socio-emotional aspects are frequently overlooked.
(G. Wang & He, 2022)	A bibliometric analysis of digital literacy in higher education using the Scopus database.
(Tinmaz et al., 2022)	A literature review based on data sources from WoS/Clarivate Analytics, ProQuest Central, Emerald Management Journals, JSTOR Business College Collections, and Scopus/Elsevier.
(Caldevilla-Domínguez et al., 2021)	A bibliometric analysis of digital literacy in higher education, particularly in tourism studies. This study uses the Scopus database.
(Reddy et al., 2020)	A literature review on the importance of digital literacy, the impact of ICT use in daily life, and the development of digital literacy models.
(Alagu & Thanuskodi, 2019)	A bibliometric analysis of digital literacy using the Web of Science database within the period 1992–2011.
(Gibson & Smith, 2018)	A systematic review of digital literacy among students and university learners, as well as the steps educators can take to develop this skill.
(Tamborg et al., 2018)	A literature review aimed at identifying the definition and application of the digital literacy concept in primary education. The databases used include Academic Search Premier, ERIC, SCOPUS, and ORIA.

Based on Table 1, bibliometric research and literature reviews utilize global article databases such as Scopus, Web of Science, Elsevier, and others. The use of international databases provides a broad scope for exploring digital literacy topics on a global scale.

Indonesian researchers have also conducted numerous bibliometric studies on digital literacy. These studies have utilized various database sources with a wide range of publication periods. The research data can be seen in Table 2

Table 2. Bibliometric analysis on digital literacy by indonesian researchers

Author	Research Content
(Latifah et al., 2024)	Bibliometric analysis on research trends in digital literacy at higher education institutions. This analysis uses the Scopus database for the period 2014-2023.
(Cahyaningtyas et al., 2024)	Bibliometric analysis on research trends in digital literacy for the visually impaired using articles indexed in Google Scholar from 2015-2022.
(Soraya et al., 2023)	Bibliometric research on digital literacy and learning outcomes using the Scopus database from 2009-2023
(Arissaputra et al., 2023)	Bibliometric research on digital literacy in the field of education in Indonesia, focusing on its applications and practical results. The data source used is Google Scholar for the period 2013-2023.
(Setyorini, 2022)	Bibliometric analysis on digital literacy using the Google Scholar database for the period 2017-2021.
(Kartanegara et al., 2024)	Bibliometric research on digital literacy and adult learners using the Scopus and Web of Science databases
(Adima et al., 2025)	Bibliometric analysis on digital literacy in higher education from an Islamic perspective. The study uses the Scopus database and journals indexed in SINTA 1 and SINTA 2 for the period 2019-2024.

(Begimbetova et al., 2023)	Bibliometric research on digital literacy using the Scopus database for the period 2017-2023

Table 2 reveals that out of the eight studies presented, only one specifically examines research trends in digital literacy in Indonesia, while the remaining seven focus on global trends. Most studies on digital literacy conducted by Indonesian researchers rely on global databases such as Scopus and Google Scholar, leading to the inclusion of articles from a worldwide scope. Additionally, the table indicates that only one study utilizes an Indonesian scientific database, namely SINTA.

SINTA is an accredited scientific research database in Indonesia, managed by the Ministry of Education, Culture, Research, and Technology. It compiles publications from various academic institutions across Indonesia, making it a key resource for understanding the research landscape within a local context. The portal provides access to scientific articles across multiple disciplines, categorized into six levels, with SINTA 1 being the highest and SINTA 6 the lowest. Given its significance in Indonesian scientific research, SINTA was chosen as the primary database for this study to accurately capture research trends in digital literacy within the field of education in Indonesia.

This study conducts a bibliometric analysis of digital literacy research in Indonesian education using the SINTA database. By employing bibliometric analysis with SINTA, this study enables the visualization of research networks, illustrating interconnections among studies and identifying key emerging topics in digital literacy research in Indonesia.This study aims to answer the following research questions:

RQ1: What are the trends in digital literacy research within Indonesian education?
RQ2: Who are the primary subjects of digital literacy implementation in Indonesia, and what are their characteristics?
RQ3: What are the accreditation levels of journals publishing digital literacy research in Indonesian education?
RQ4: What research approaches are most commonly applied in digital literacy studies within Indonesian education?
RQ5: How is digital literacy research in education distributed across Indonesian provinces?
RQ6: What are the most frequently associated topics with digital literacy in Indonesian education?

▪ METHOD

Research Design

This study uses bibliometric analysis. Bibliometric analysis is able to map developments and changes in a scientific field of study, identify the most influential researchers and is used for research performance assessment (Wu et al., 2025). This analysis is carried out in several stages, namely determining research questions, determining the criteria for articles to be analyzed, searching and selecting articles, reviewing articles and determining results. The workflow can be seen in Figure 1.

Figure 1. Research procedures (Koswojo et al., 2024)

Search Strategy

As part of the literature review, article searches were carried out using the Sinta database. Sinta presents scientific journals that have been accredited in accordance with their specific categories.

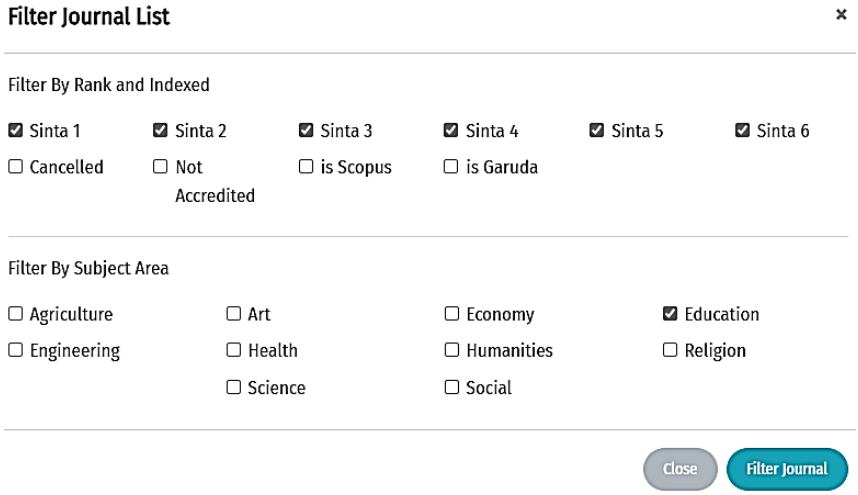

Figure 2. Jurnal filtering

Figure 1 depicts the process of journal searching within the SINTA database. To answer the research questions, the journal search was confined to journals indexed in Sinta 1 to Sinta 6 within the education domain. This limitation ensured that only education-related journals were considered in the analysis. The search was not restricted by time, allowing for the inclusion of the earliest studies on digital literacy in Indonesia. A list of relevant journals was then compiled, and subsequent article searches were conducted on the websites of these journals. In this phase, a total of 1,304 journals that met the criteria were identified.

Inclusion and Exclusion Criteria

In the second phase, article searches were conducted on the websites of each respective journal. Further screening was conducted using the keyword "digital" to include both English and Indonesian-language articles discussing digital literacy. Articles containing the terms "digital literacy" or "literasi digital" were downloaded for further screening. The inclusion and exclusion criteria shown in table below.

Table 3. Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Context	Educational context	Non-educational context

Research location	Indonesia	Outside Indonesia
Research method	Quantitative method, Qualitative method, Research and Development, Mixed Method	Literature review, meta analysis
Language	Indonesia and English	Non English or Non Indonesia

Table 2 details the article selection process based on predefined criteria. The downloaded articles underwent a screening process to ensure they met the inclusion requirements. First, only articles related to education were considered to align with the research objectives. Second, the studies had to be conducted within Indonesia. Third, literature reviews and meta-analyses were excluded to ensure that the analysis was based on primary research data. Fourth, the articles had to be written in either Indonesian or English. Only articles that fulfilled all these criteria were selected for further analysis.

The selection process was carried out manually by examining the titles and abstracts to determine their relevance to the research focus. Articles deemed suitable were then recorded for an in-depth review.The search for articles across all Sinta-indexed journal websites was conducted between December 9–19, 2024.

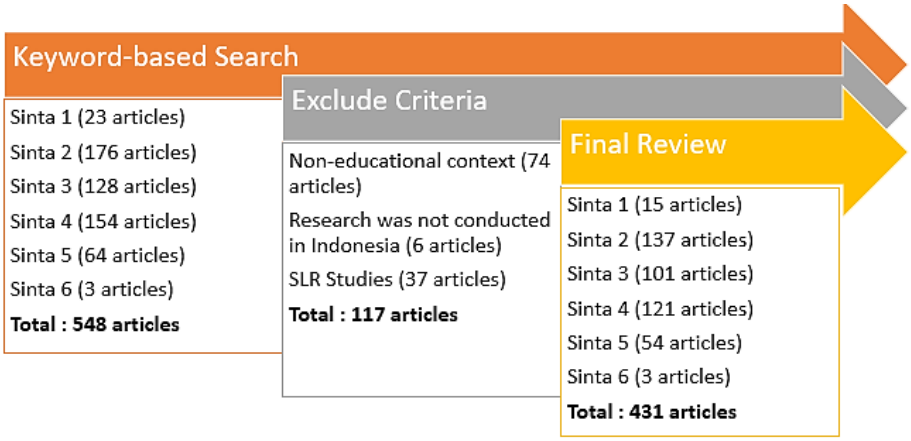

Figure 3. Schematic of the relevant article search process

Figure 3 menunjukkan proses seleksi artikel yang dilakukan. After a rigorous selection process, 548 articles were initially included. Abstracts were reviewed to ensure alignment with the study criteria. A total of 117 articles were excluded for not meeting the criteria, resulting in 431 articles used for this study.

Data Analysis

The collected articles were analyzed using a qualitative descriptive approach. The analysis process involved several stages. First, the abstracts of each article were reviewed to understand the scope of the research and its relevance to this study. Second, key information was extracted from each article to address the research questions. This included publication year, journal accreditation category (based on Sinta), research location, study subjects, research methodology, and keywords. Third, the collected data was analyzed to identify patterns, answer the research questions, and visualize the findings. Lastly, conclusions were drawn based on the results, along with recommendations for future research directions.

To explore the most frequently studied topics related to digital literacy, the research findings were visualized using VosViewer. This network analysis illustrated the relationships between various topics, highlighting the most commonly discussed themes. To enhance clarity, the visualization was categorized into four distinct clusters, each represented by a different color.

Additionally, a geographic distribution map was used to provide a clearer picture of digital literacy research across different regions in Indonesia. This map used a color gradient, where darker shades indicated a higher concentration of research, while lighter shades signified regions with relatively fewer studies on the topic.

▪ RESULT AND DISSCUSSION

RQ1: What are the trends in digital literacy research within Indonesian education?

This research question explores the development of digital literacy research in Indonesia, identifying when digital literacy in education began to be studied and how interest in this topic has grown over time. The analysis of 431 articles based on their publication years is presented in Figure 3.

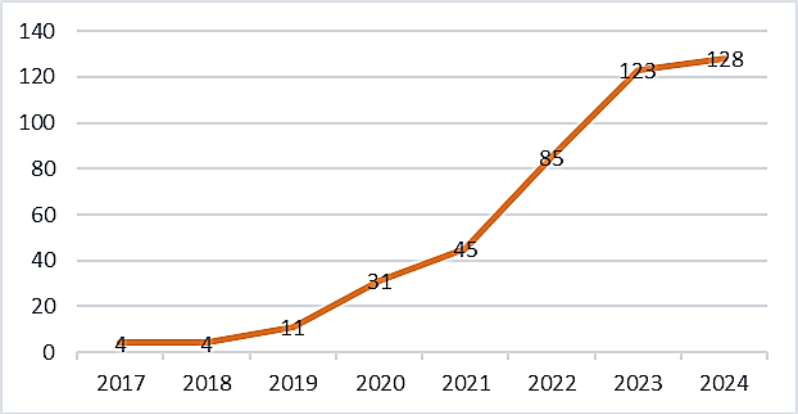

Figure 4. Trends in digital literacy research in indonesian education

As shown in Figure 3, research on digital literacy in the field of education was first published in 2017, with four articles emerging that year. A similar number of studies were published in 2018. However, from 2019 to 2023, interest in this topic grew significantly, reaching a peak of 123 studies in 2023.

One of the key drivers behind this surge in research was the shift to online learning during the COVID-19 pandemic in 2019. During this period, all educational activities were conducted remotely, leading to an increased reliance on digital tools in the learning process. This prompted researchers to investigate digital literacy levels among students, teachers, and academic staff. Studies on digital literacy skills employed various assessment instruments, such as the DigCompSAT developed by the European Union and digital literacy assessment tools created by the Indonesian Ministry of Communication and Digital Affairs.

RQ2: Who are the primary subjects of digital literacy implementation in Indonesia, and what are their characteristics?

This research question aims to determine the educational levels where digital literacy has been implemented and to identify the subjects that attract the most research interest.

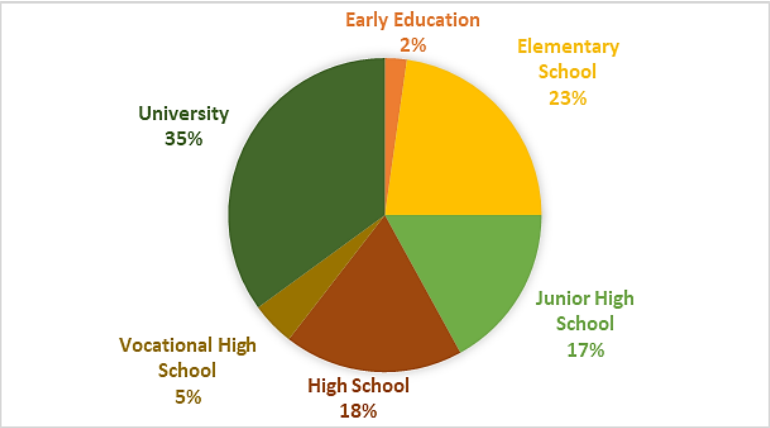

Figure 5. Research subjects

Based on the analysis of 431 selected articles, digital literacy implementation has been studied across all levels of education, involving stakeholders from early childhood education to higher education. As depicted in Figure 4, universities are the most frequently studied subjects in digital literacy research. Studies in higher education focus on university lecturers, students, and academic staff. Given that higher education institutions play a crucial role in advancing research and technology, it is expected that they implement digital literacy effectively to maximize the use of technology for research and education.

The second most researched group in digital literacy implementation and skill assessment in Indonesia is elementary school students. Studies at this level aim to assess students' and teachers' digital literacy levels, the integration of technology into learning, and parents' understanding of digital literacy. Elementary school students require guidance and support from their surroundings. At this stage, their curiosity and eagerness to explore digital technology make it essential for teachers and parents to possess adequate digital literacy skills to guide and set responsible technology use examples.

Research on digital literacy in secondary education has also gained attention, focusing on the implementation of various technology-based teaching methods, assessments of students' and teachers' digital literacy levels, and training programs for educators. Interestingly, studies on vocational high schools (SMK) account for only 5% of the total research. Despite the emphasis on preparing students for the workforce and their frequent interaction with technology, vocational schools have not yet attracted significant research interest.

RQ3: What are the accreditation levels of journals publishing digital literacy research in Indonesian education?

This research question seeks to assess the quality of published articles on digital literacy in education by examining the accreditation levels of the journals in which they

appear. Higher journal accreditation levels indicate higher publication quality. In Indonesia's scientific journal database, Sinta, the highest accreditation level is Sinta 1, while the lowest is Sinta 6.

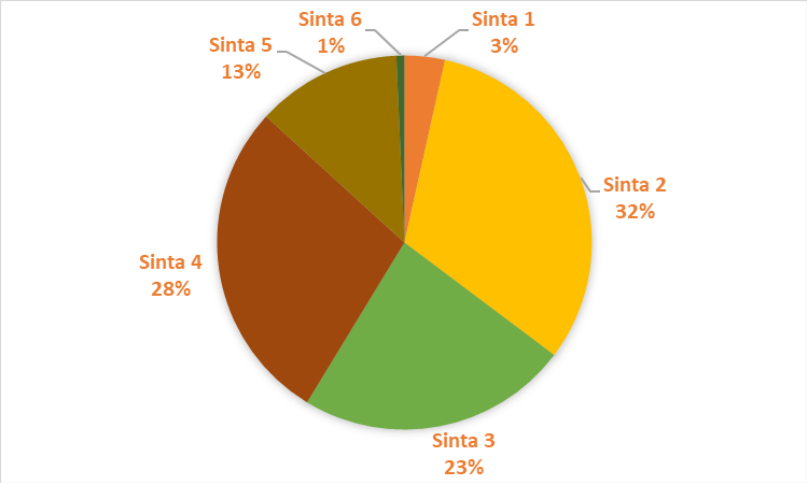

Figure 6. Article distribution across journals

Figure 5 presents the distribution of digital literacy articles published in Sinta-accredited journals. Journals with Sinta 2 accreditation have published the most articles on digital literacy in education. Sinta 3 and Sinta 4 journals follow closely, with 28% and 23% of publications, respectively. These findings suggest that most digital literacy research in education is published in relatively high-quality journals. Meanwhile, Sinta 1 journals account for only 3% of the publications, and Sinta 6 journals contribute just 1%.

RQ4: What research approaches are most commonly applied in digital literacy studies within Indonesian education?

The analysis identifies four main research approaches used in digital literacy studies in Indonesian education: quantitative, qualitative, mixed-methods, and Research and Development (R&D). Their distribution is illustrated in Figure 6.

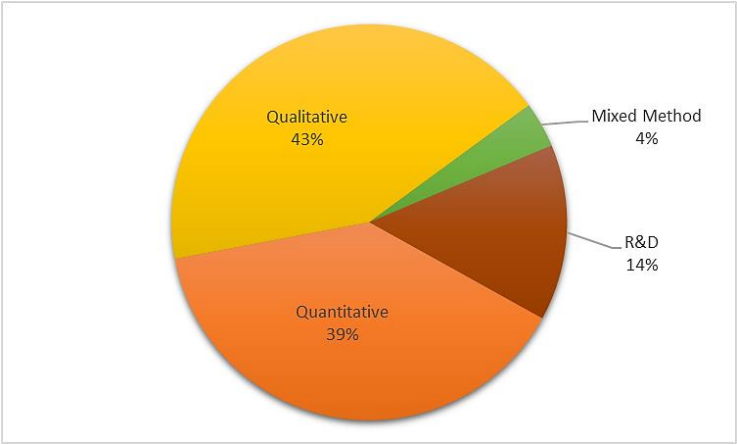

Figure 7. Distribution of research types

Figure 6 provides a clearer picture of the dominant research methodologies in this field. Qualitative research is the most frequently employed approach. Qualitative analysis is considered suitable for assessing the implementation of digital literacy, as it enables a comprehensive and in-depth exploration of its execution. The most methods used is interviews and document analysis. Since these studies are conducted in the education sector, document analysis focuses on academic materials, while interviews are conducted with various stakeholders, including students, teachers, school principals, academic staff, parents, lecturers, and university students.

Quantitative research contributes 39% of all studies, employing methods such as descriptive analysis, regression, correlation analysis, Structural Equation Modeling (SEM-PLS), T-tests, ANOVA, ANCOVA, MANOVA, and meta-analysis. These studies often focus on measuring digital literacy levels, assessing digital skills, and examining the relationship between digital literacy and academic performance.

Research and Development (R&D) studies account for 14% of the total research. Many researchers conduct Research and Development (R&D) to create instructional media and assessments aimed at enhancing the implementation of digital literacy in education. The developed products are tailored to the specific needs of the target users. These studies focus on developing teaching methods, digital learning media, and digital literacy assessment tools. This aligns with the findings of Lima Neto & Carvalho (2022), which highlight that digital literacy is often associated with the use of tools and devices, while aspects of awareness and socio-emotional considerations in their usage receive less attention. Mixed-methods research, which combines qualitative and quantitative approaches for a more comprehensive analysis, contributes 4% to the overall research landscape.

RQ5: How is digital literacy research in education distributed across Indonesian provinces?

Results Based on the analysis, the geographical distribution of digital literacy research in Indonesia is presented in Figure 7.

Figure 8. Digital literacy research in education distributed across Indonesian provinces

As seen in Figure 7, research is predominantly concentrated in Java, while studies in eastern Indonesia remain relatively scarce. Sumatra accounts for 20% of the research, with North Sumatra, West Sumatra, Jambi, Lampung, and Riau contributing the most studies. Detailed figures are provided in Table 2.

Table 4. Geographical distribution of digital literacy research in indonesian education

No	Province	Num of articles	No	Province	Num of articles
1	East Java	77	17	West Nusa Tenggara	6
2	West Java	62	18	East Nusa Tenggara	4
3	Central Java	54	19	North Maluku	4
4	Jakarta	33	20	Papua	4
5	DI Yogyakarta	29	21	South Kalimantan	4
6	Banten	22	22	Southeast Sulawesi	4
7	North Sumatera	15	23	Maluku	3
8	West Sumatera	15	24	North Sulawesi	3
9	Jambi	12	25	Bengkulu	2
10	Lampung	11	26	Central Kalimantan	2
11	Riau	11	27	Central Sulawesi	2
12	South Sulawesi	11	28	West Sulawesi	2
13	South Sumatera	11	29	Bangka Belitung	1
14	Aceh	9	30	Riau Island	1
15	West Kalimantan	9	31	South Papua	1
16	Bali	7			

Table 2 indicates that the provinces with the highest research activity are East Java, West Java, Central Java, Jakarta, Yogyakarta, and Banten, collectively contributing 64% of all studies. This trend highlights the concentration of research in Java, where educational and research infrastructure is more developed. The high volume of research also reflects the emphasis placed on research excellence by leading universities in Java. One of the contributing factors is the higher number of universities in Java compared to other islands in Indonesia. According to data released by the Directorate General of Higher Education, Ministry of Education, Culture, Research, and Technology in 2023, Java is home to 1,674 universities out of a total of 3,422 universities in Indonesia. This accounts for 48.92% of the country's higher education institutions. This concentration of universities has contributed to the higher volume of research conducted in Java compared to other regions in Indonesia.

Research on digital literacy in education outside Java, especially in Eastern Indonesia, is crucial to providing a more comprehensive overview of digital literacy studies in the country. Moreover, it can help identify the challenges faced by regions in Eastern Indonesia in implementing digital literacy initiatives.

RQ6: What are the most frequently associated topics with digital literacy in Indonesian education?

This research question aims to identify the key topics associated with digital literacy in education. To achieve this, a network analysis was conducted using the VosViewer application, with the results presented in Figure 8.

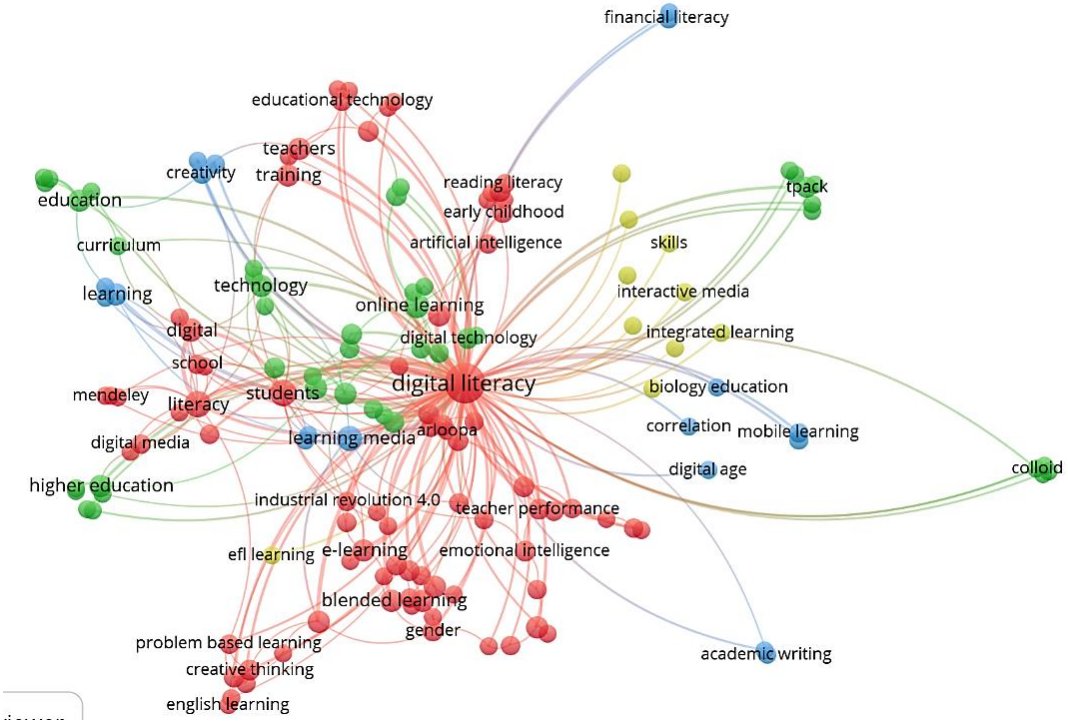

Figure 9. Network visualization

The network visualization in Figure 8 highlights the connections between digital literacy and other research topics. Keywords appear as nodes in circles, with larger circles indicating higher frequency and stronger associations with digital literacy. The visualization is divided into four distinct clusters: red, green, blue, and yellow.

The red cluster is the dominant color in this visualization. This cluster connects digital literacy with students, literacy, digital, schools, digital media, Mendeley, the industrial revolution 4.0, teacher performance, e-learning, emotional intelligence, communication skills, blended learning, learning outcomes, e-learning, problem-based learning, creative thinking, English learning, artificial intelligence, early childhood education, teachers, training, critical thinking skills, problem-solving skills, gender, teacher competence, 21st-century learning, curiosity, self-determination, learning processes, media literacy, distance learning, interpersonal communication, independent learning, QR codes, Schoology, local wisdom, English learning, English language teaching, educational technology, needs analysis, implementation, independent learning, and digital literacy skills. In total, this cluster consists of 43 keywords.

The green cluster links digital literacy with 35 keywords. The keywords in this cluster include online learning, digital technology, technology, curriculum, education, higher education, colloid, TPACK, character education, social media, e-learning, reading

interest, elementary school students, digital culture, Google Classroom, Kurikulum Merdeka, microteaching, the COVID-19 pandemic, the digital literacy era, ability, Likert scale, perception, mathematics learning, hybrid learning, plant, critical digital literacy, Indonesia, space geometry flipbook, development, school leadership, HOTS (Higher Order Thinking Skills), integrated science, Discord application, flipped classroom, and scientific literacy. This cluster highlights the relationship between digital literacy and formal education, the integration of technology in education, and creativity.

The blue cluster contains 18 keywords. These keywords include learning media, learning, creativity, biology education, correlation, mobile learning, the digital age, academic writing, multimedia, instructional videos, microsites, learning materials, EFL teachers, Instagram, learning media, the Indonesian language, learning, and YouTube. In this cluster, digital literacy is also linked to specific skills and subjects such as financial literacy, writing skills, biology, and English language learning. The relatively similar sizes of the circles indicate that there is still limited research connecting digital literacy with the topics in this cluster.

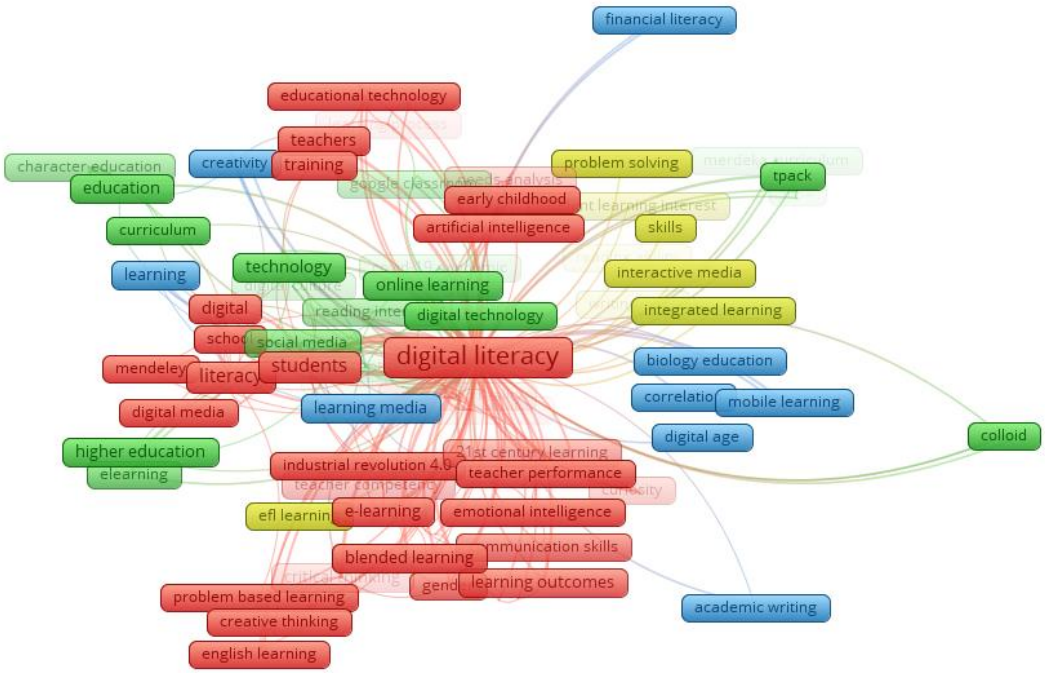

Figure 10. Network visualization

The fourth cluster, colored yellow, links digital literacy with 8 keywords. These keywords include problem-solving, skills, interactive media, integrated learning, EFL learning, student learning interest, writing skills, and reading ability. In this cluster, research exploring the relationship between digital literacy and these keywords remains relatively scarce. This is evident from the thin connecting lines linking digital literacy to these keywords, suggesting that these topics have yet to be extensively explored.

Based on the network analysis presented in Figure 9 and Figure 10, research on digital literacy in education primarily focuses on pedagogy, technology integration in learning, the use of digital media, and various educational factors. Key terms frequently

associated with digital literacy in education include students, teacher training, online learning, blended learning, technology, higher education, digital media, artificial intelligence, and educational technology. However, there is still considerable room for further research, particularly in specialized disciplines such as STEM, its influence on students' academic and non-academic skills, and its role in shaping students into responsible and ethical members of the digital society.

To ensure effective implementation, digital literacy should not remain merely theoretical but should be actively practiced by students in their daily lives. Teachers, as key facilitators of digital literacy education, must also possess strong digital competencies. In practice, digital literacy can be integrated across all subjects, as digital technology is not confined to specific disciplines but plays a crucial role across various educational contexts.

▪ CONCLUSION

Based on the analysis of the collected articles, it was found that research on digital literacy in Indonesian education was first published in 2017 and has shown significant growth up to 2024. This increase reflects the rising attention and interest in exploring digital literacy within the educational sector in Indonesia. The studies conducted highlight the crucial role of education in enhancing digital literacy skills among the public. Journals with Sinta 2, Sinta 3, and Sinta 4 accreditation are the most active in publishing research in this field. The qualitative approach is the most commonly used research method. Geographically, provinces on Java Island, such as East Java, West Java, and Central Java, dominate digital literacy research in education. In terms of education levels, studies have been conducted across all levels, from early childhood education to higher education, with varying contributions.

The mapping analysis using VOSviewer provides insights into the research topics frequently associated with digital literacy, helping shape future research directions. Digital literacy studies in education cover a wide range of topics, but many areas remain underexplored, offering ample opportunities for future research. This study aims to serve as a valuable reference for future researchers interested in digital literacy in Indonesian education.

The mapping analysis using VOSviewer provides insights into the research topics frequently associated with digital literacy. Digital literacy research in Indonesian education predominantly explores pedagogical dimensions, educational technology, and its effects on teachers and students. However, there remains considerable potential for further investigation in more specialized domains, such as financial literacy and academic writing, particularly in relation to students' academic and non-academic competencies and their preparedness for responsible participation in the digital society. Additionally, future studies should broaden their geographical focus beyond Java to achieve a more comprehensive and representative understanding of digital literacy trends across Indonesia.

▪ REFERENCES

Adima, M. F., Baharudin, Syafe'i, I., Zulaikha, S., Susilawati, B., & Shabira, Q. (2025). Digital literacy trends in islamic perspective in higher education: a bibliometric

review. Jurnal Penelitian Pendidikan IPA, 10(12), 1012–1026. https://doi.org/10.29303/jppipa.v10i12.9847

Alagu, A., & Thanuskodi, S. (2019). Bibliometric analysis of digital literacy research output: a global perspective. 2127.

Arissaputra, R., Sobandi, A., Sentika, S., Adib Sultan, M., & Putu Nurwita Pratami Wijaya, N. (2023). Trend analysis using bibliometric study on digital literacy in education. International Journal Of Humanities Education and Social Sciences (IJHESS), 3(3). https://doi.org/10.55227/ijhess.v3i3.667

Asmayawati, Yufiarti, & Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. Journal of Open Innovation: Technology, Market, and Complexity, 10(1), 100233. https://doi.org/10.1016/j.joitmc.2024.100233

Begimbetova, G. A., Retnawati, H., Nogaibayeva, A. A., Sansyzbayeva, D. B., & Triyono, M. B. (2023). Bibliometric analysis of research related to digital literacy using the scopus database from 2017-2023. Materials of International Practical Internet Conference "Challenges of Science," 5–14. https://doi.org/10.31643/2023.01

Bejaković, P., & Mrnjavac, Ž. (2020). The importance of digital literacy on the labour market. Employee Relations: The International Journal, 42(4), 921–932. https://doi.org/10.1108/ER-07-2019-0274

Brashier, N. M., & Schacter, D. L. (2020). Aging in an era of fake news. Current Directions in Psychological Science, 29(3), 316–323. https://doi.org/10.1177/0963721420915872

Cahyaningtyas, E., Wulansari, A., Priatna, Y., & Sumaryanti, L. (2024). *Pemetaan bibliometrik terhadap perkembangan penelitian dengan topik literasi digital pada tuna netra.* Publication Library and Information Science, 8(1), 71–83. https://doi.org/10.24269/pls.v8i1.9790

Caldevilla-Domínguez, D., Martínez-Sala, A.-M., & Barrientos-Báez, A. (2021). Tourism and ICT. bibliometric study on digital literacy in higher education. Education Sciences, 11(4), 172. https://doi.org/10.3390/educsci11040172

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Fonseca, J., & Borges-Tiago, T. (2023). Digital literacy education and cyberbullying combat: scope and perspectives. The International Conference on Strategic Innovative Marketing and Tourism, 157–164.

Fukuyama, M. (2018). Society 5.0: Aiming for a new human-centered society. Japan Spotlight, 27(5), 47–50. http://www8.cao.go.jp/cstp/

Gibson, P. F., & Smith, S. (2018). Digital literacies: preparing pupils and students for their information journey in the twenty-first century. Information and Learning Science, 119(12), 733–742. https://doi.org/10.1108/ILS-07-2018-0059

Ika Sari, G., Winasis, S., Pratiwi, I., Wildan Nuryanto, U., & Basrowi. (2024). Strengthening digital literacy in Indonesia: Collaboration, innovation, and sustainability education. Social Sciences & Humanities Open, 10, 101100. https://doi.org/10.1016/j.ssaho.2024.101100

Kartanegara, H. T., Kamil, M., Sudiapermana, E., Saefudin, A., Pramudia, J. R., & Abdullah, K. H. (2024). Tracing the footprints of digital literacy and adult learners: A bibliometric perspective. Multidisciplinary Reviews, 7(10), 2024218. https://doi.org/10.31893/multirev.2024218

Kementerian Komunikasi dan Informatika. (2024). *Kerangka acuan kerja jasa lainnya*. https://eppid.kominfo.go.id/storage/uploads/1_51_01._KAK_Redacted.pdf

Komarudin, K., Suherman, S., & Vidákovich, T. (2024). The RMS teaching model with brainstorming technique and student digital literacy as predictors of mathematical literacy. Heliyon, 10(13), e33877. https://doi.org/10.1016/j.heliyon.2024.e33877

Koswojo, J., Kusairi, S., Sutopo, S., & Supriana, E. (2024). Improving representational competence in physics education: a systematic review and future research directions. Jurnal Pendidikan MIPA, 25(4), 1906–1924. https://doi.org/10.23960/jpmipa/v25i4.pp1906-1924

Latifah, S. R., Winoto, Y., & Khadijah, U. L. S. (2024). *Analisis bibliometrik: perkembangan tren penelitian literasi digital di perguruan tinggi dalam database scopus (2014 - 2023)*. IQRA` Jurnal Ilmu Perpustakaan Dan Informasi (e-Journal), 18(2), 230. https://doi.org/10.30829/iqra.v18i2.21627

Lima Neto, N. V., & Carvalho, A. B. de. (2022). Digital literacy: a brief literature review of in-between concepts and of teachers' conceptions. Texto Livre, 15, e40207. https://doi.org/10.35699/1983-3652.2022.40207

Muawanah, U., Marini, A., & Sarifah, I. (2024). The interconnection between digital literacy, artificial intelligence, and the use of E-learning applications in enhancing the sustainability of Regional Languages: Evidence from Indonesia. Social Sciences & Humanities Open, 10, 101169. https://doi.org/10.1016/j.ssaho.2024.101169

Musyaffi, A. M., Adha, M. A., Mukhibad, H., & Oli, M. C. (2024). Improving students' openness to artificial intelligence through risk awareness and digital literacy: Evidence form a developing country. Social Sciences & Humanities Open, 10, 101168. https://doi.org/10.1016/j.ssaho.2024.101168

Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital literacy. International Journal of Technoethics, 11(2), 65–94. https://doi.org/10.4018/IJT.20200701.oa1

Setyorini, T. W. (2022). Bibliometric analysis of research in digital literacy using google scholar database from 2017-2021. Journal of Educational Technology and Instruction, 1(1), 62–70. https://doi.org/10.70290/jeti.v1i1.4

Soraya, S. M., Kurjono, K., & Muhammad, I. (2023). *Analisis bibliometrik : penelitian literasi digital dan hasil belajar pada database scopus (2009-2023)*. EDUKASIA: Jurnal Pendidikan Dan Pembelajaran, 4(1), 387–398. https://doi.org/10.62775/edukasia.v4i1.270

Tamborg, A. L., Dreyøe, J. M., & Fougt, S. S. (2018). Digital literacy - a qualitative systematic review. Tidsskriftet Læring Og Medier (LOM), 11(19), 29. https://doi.org/10.7146/lom.v11i19.103472

Tinmaz, H., Lee, Y.-T., Fanea-Ivanovici, M., & Baber, H. (2022). A systematic review on digital literacy. Smart Learning Environments, 9(1), 21. https://doi.org/10.1186/s40561-022-00204-y

UNESCO Institute for Statistics. (2018). A Global framework of reference on digital literacy skills for indicators 4.4.2. http://www.uis.unesco.org

Wang, C., & Si, L. (2023). A bibliometric analysis of digital literacy research from 1990 to 2022 and research on emerging themes during the COVID-19 Pandemic. Sustainability, 15(7), 5769. https://doi.org/10.3390/su15075769

Wang, G., & He, J. (2022). Bibliometric analysis on research trends of digital literacy in higher education from 2012 to 2021. International Journal of Emerging Technologies in Learning (IJET), 17(16), 43–58. https://doi.org/10.3991/ijet.v17i16.31377

Wu, D., Qu, S., Sun, H., Zhou, S., Qu, X., Chen, Y., Hu, H., & Li, X. (2025). Unveiling the brain mechanism underlying depression: 12 Years of insights from bibliometric and visualization analysis. Brain Research Bulletin, 222, 111246. https://doi.org/10.1016/j.brainresbull.2025.111246

Wu, D., Sukumaran, S., Zhi, X., Zhou, W., Li, L., & You, H. (2024). Categories, themes and research evolution of the study of digital literacy: a bibliometric analysis. Education and Information Technologies. https://doi.org/10.1007/s10639-024-12955-x

Yang, F., Yao, R., Ren, Y., & Guo, L. (2025). Harmony in diversity: Digital literacy research in a multidisciplinary landscape. Computers & Education, 230, 105265. https://doi.org/10.1016/j.compedu.2025.105265

Zhang, Q., Sun, H., Xin, Y., Li, X., & Shao, X. (2024). Studies on pain associated with anxiety or depression in the last 10 years: a bibliometric analysis. Journal of Pain Research, Volume 17, 133–149. https://doi.org/10.2147/JPR.S436500