DIGITAL LITERACY IN ELEMENTARY SCHOOLS: A BIBLIOMETRIC ANALYSIS

Erna Kusumawati*

Universitas Muhammadiyah Prof. Dr. HAMKA, Indonesia

Correspondence: ernaku1903@gmail.com

ABSTRACT

In recent years, there has been an increase in research aimed at better understanding the use of technology, especially in education. After the pandemic, the need for technology will increase and research on the use of technology will increase, unfortunately research on technological capabilities for individuals in elementary education institutions is still rarely touched on, so this study aims to map publications through bibliometric analysis on the topic of digital literacy in elementary schools. The bibliometric method was used to retrieve 517 journal articles from Googlescholar (GS). Utilizing co-citation analysis and co-word analysis, we determined the most influential publications, mapped the structure of knowledge, and predicted future trends. The results of the co-word analysis showed seven clusters. The results can be used as a roadmap for future research on digital literacy by various stakeholders, including policy makers, university administrators, funders, and educators.

ARTICLE INFO

1. INTRODUCTION

Due to the COVID-19 pandemic that emerged in early 2020, many schools were forced to close, leading to coercive educational innovations where all elements of schools had to rely on technology to facilitate the teaching and learning process (Duin & Tham, 2020; Katić et al., 2021). Rapid technological developments are able to bring about rapid and massive changes in the field of education. The increasing prominence of technology and its integration into digital processes has spurred the necessity for digital education. The growing dependence on digital technology necessitates careful consideration of individuals' digital usage, online interactions, and their proficiency in carrying out digital-related tasks (Reddy et al., 2023).

In order to effectively cope with the rapid and extensive technological advancements that we are witnessing today, it is of utmost importance for every individual involved in the field of education to acquire and possess a comprehensive set of digital skills. These skills act as the fundamental building blocks that enable individuals to utilize technology in a professional manner, afterward playing a pivotal role in determining the overall efficiency and success of technology implementation within the digital era. It is essential to acknowledge that the degree to which information technology is utilized effectively and productively predominantly hinges upon the strategies, approaches, and methodologies employed by individuals when engaging with it (Shyr & Chen, 2018; Thangeni, 2022).

One of the skills that must be possessed by every educational individual to be able to adapt to existing developments is digital literacy skills. according to Martin (Statti & Torres, 2020) Digital literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others , in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process (Feuchtwang, 2018; Haryani, 2023; Reddy et al., 2023).

In today's rapidly evolving landscape of digital transformation and digitalization, the acquisition of proficient digital skills has emerged as an indispensable prerequisite for individuals seeking to effectively compete and thrive. This holds particularly true within the realm of tertiary education, where digital literacy assumes paramount significance owing to the pervasive integration of digital media and technologies into pedagogical practices. However, a significant distinction can be observed when comparing the utilization of technology between basic education and tertiary institutions. In the context of basic education, both students and teachers commonly possess limited proficiency in leveraging technology as a tool for learning and instruction. Initially, in the Indonesian educational landscape, the extensive utilization of technology was not widespread within the domain of basic education. Nonetheless, with the advent of the pandemic, a paradigm shift was necessitated, compelling basic education institutions to swiftly adopt and incorporate technology as an essential means of facilitating instruction and enabling distance learning (Besser et al., 2022; Nasution et al., 2020; Rayuwati, 2020).

Based on this, the authors are interested in conducting a bibliometric analysis of how digital literacy is in basic education. while Bibliometric analysis is a data-driven research

method that allows researchers to identify and interpret patterns and trends in scientific literature (Donthu et al., 2021). The main objective of this study is to acquire a comprehensive understanding of the existing literature regarding digital literacy in the context of basic education. To the best of the authors' knowledge, no prior bibliometric analysis has been conducted within this specific domain. Hence, this study places a particular emphasis on comprehending the literature concerning digital literacy in basic education through the utilization of a bibliometric approach. This research serves to address an existing gap by providing a comprehensive examination of past, present, and future research areas pertaining to digital literacy in basic education.

2. METHOD

This Literature using a bibliometric method, which proves valuable in examining current research trends, tracking the growth of studies, and exploring diverse publications. The utilization of bibliometrics is advantageous due to its ability to reveal connections between keywords through direct and indirect relationships, ultimately leading to a closer spatial arrangement of related entities on the map (De' et al., 2020; Komalasari et al., 2021). This review using a secondary data documentation method for data collection. This method involves locating and extracting relevant information from literature sources that pertain to the research problem. In terms of data analysis, an annotated bibliography approach was utilized. Annotation refers to providing concise summaries or conclusions derived from articles, books, journals, or other written sources. On the other hand, a bibliography entails a list of sources on a particular topic. Consequently, a bibliographic annotation entails listing the sources used in the study and providing concise conclusions or summaries of their contents. In this study, a Bibliometric review was conducted using a five-measure method. This research consists of five sequential research steps, which include the determination of search keywords, initial retrieval of search results, refinement of search results, compilation of preliminary data statistics, and data analysis (Bornmann, 2014; Hamidah et al., 2020; Setyaningsih et al., 2018).

Determination of search keywords

The data collection was carried out in May 2023 with the keywords "Digital Literacy in Elementary School" and "Digital Literacy in Primary School". Search data using the Publish or Perish 8 (POP 8) software developed by Harzing with data sources from Google Scholar with a disbursement period of the last ten years from 2013 to 2023

Initial retrieval of search results

From the search results, several types of publications were obtained, such as journal articles, books, reports, and proceedings. The first search results using PoP software with the Googlescholar database obtained 610 articles. The details are as follows

Tabel 1. Search Result

Source	:	Google Scholar
Papers	:	610
year_first	:	2013
year_last	:	2023

Refinement of search results

Once the initial data has been acquired, a manual process of screening and filtering is conducted. The screening process involves applying the predefined inclusion criteria. The table 2 bellow serves as a matrix for filtering the obtained articles, with the filtering process being carried out manually. As a result of the filtering process, a total of 517 articles are retained.

Tabel 2. Result Criteria

Publication Type	Journal/Proceeding
Language	Indonesia/English
Topic	Relevant to the topic of digital literacy
Access	Open Access

3. HASIL DAN PEMBAHASAN
3.1 Hasil
Trends in publication and descriptive analysis

Based on the results of research using the Google Scholar database, this research (n = 517) has been cited 2577 times, with the number of citations per year 257.70 per year, the average citation per article is 4.98 citations per article. These 517 papers demonstrate a rising tide of interest in the topic of digital literacy in elementary school. Considering the constraints and constraints inherent in the scope of this research, the process of searching for relevant articles was initiated in the year 2013. At the outset, the initial search endeavor yielded a modest compilation of 16 articles that met the predefined criteria. However, a marginal decline was observed in the subsequent year of 2014, resulting in the identification and inclusion of 15 articles in the analysis. Notwithstanding this temporary dip, the subsequent years witnessed a discernible and promising upswing in research dedicated to the exploration of the theme at hand. This upward trajectory persisted, culminating in an impressive pinnacle in the year 2022, whereby an extensive corpus of 126 articles was amassed and meticulously examined to derive insights and enrich the understanding of digital literacy in elementary schools. To gain a more comprehensive and detailed understanding of the publication trends and their chronological progression pertaining to the subject matter under scrutiny, Figure 1 provides an illustrative visualization and serves as a valuable point of reference.
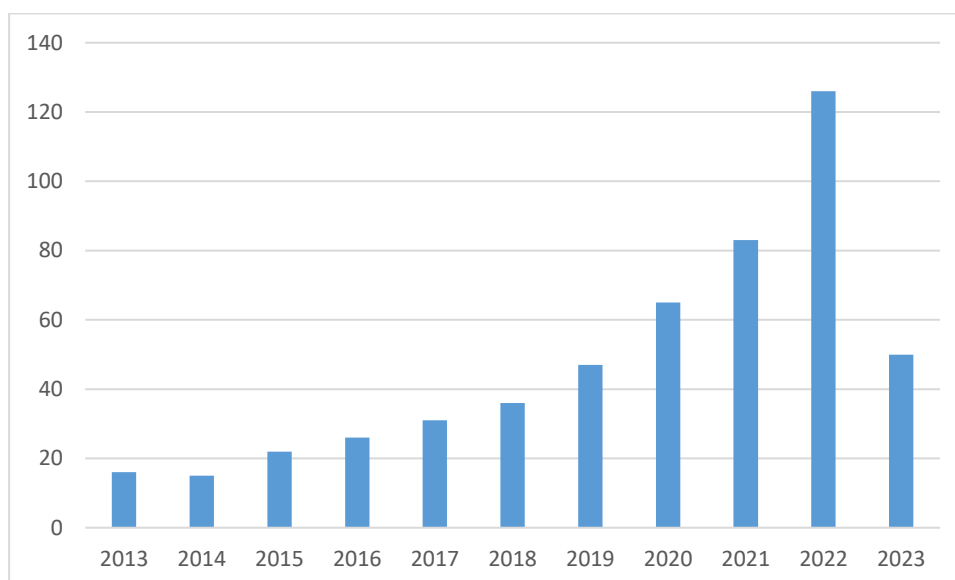
Figure 1. Publication Tren

In the initial years of data findings, specifically in 2013, the exploration of research themes related to digital literacy exhibited a relatively restricted scope, characterized by temporary and transient focuses that predominantly revolved around specific subjects or learning topics(Colwell et al., 2013; Kotluk & Kocakaya, 2015; Shortt, 2014; Zheng et al., 2013). These areas of investigation encompassed the examination of the practical application of laptops within educational environments, the integration of digital literacy within music and art education, as well as the utilization of diverse applications or web-based tools as instructional aids. However, as the chronological progression unfolded, subsequent studies on digital literacy underwent a discernible shift in their emphasis, transitioning towards a more prominent advocacy for digital literacy awareness and its pragmatic implementation within the broader domain of education. It is noteworthy, however, that the perception of digital literacy and its effectiveness remained somewhat subjective, contingent upon the specific subject or disciplinary domain being investigated, as well as the degree of preparedness exhibited towards the seamless integration of digital literacy within various educational contexts (Alexieva, 2019; Mahoney & Khwaja, 2016; Pothier, 2019). In recent times, researchers have demonstrated an escalating concern regarding the practical implementation of digital literacy, accompanied by an urgent call to augment digital competence not only among teachers but also encompassing students and school principals. This collective effort aims to foster an environment conducive to effective school management practices in the ever-evolving landscape of the digital era digital (Agusprayuningtyas et al., 2022; Arsih et al., 2023; Dashtestani & Hojatpanah, 2022; Putri & Sari, 2020).

Based on the results obtained from the analysis of the meticulously collected data, the diligent meticulously processed the dataset in order to meticulously identify the ten research articles that received the highest number of citations. The meticulous sorting process, which involved utilizing MS Excel, was meticulously conducted by leveraging the meticulously captured data through the renowned research tool, Publish or Perish. Notably, out of a grand

total of 517 scholarly articles that were carefully examined, meticulously scrutinized, and comprehensively assessed, the meticulously compiled Table 3 now meticulously showcases the meticulously selected ten articles that have garnered the highest number of citations.

Tabel 3. Most Cited Article

NO	Cites	Authors	Title	Year
1	150	M Blikstad-Balas	Digital literacy in upper secondary school–what do students use their laptops for during teacher instruction?	2015
2	118	C Ehret, T Hollett	Embodied composition in real virtualities: Adolescents' literacy practices and felt experiences moving with digital, mobile devices in school	2014
3	104	B Zheng, M Warschauer…	Digital writing and diversity: The effects of school laptop programs on literacy processes and outcomes	2013
4	103	J Marsh	The digital literacy skills and competences of children of pre-school age	2016
5	99	J Colwell, S Hunt-Barron…	Obstacles to developing digital literacy on the Internet in middle school science instruction	2013
6	97	B Walther, R Hanewinkel…	Effects of a brief school-based media literacy intervention on digital media use in adolescents: Cluster randomized controlled trial	2014
7	69	S Patmanthara, WN Hidayat	Improving vocational high school students digital literacy skill through blended learning model	2018
8	66	AW Lazonder, A Walraven, H Gijlers, N Janssen	Longitudinal assessment of digital literacy in children: Findings from a large Dutch single-school study	2020
9	63	DF Cihak, R Wright, CC Smith, D McMahon…	Incorporating functional digital literacy skills as part of the curriculum for high school students with intellectual disability	2015
10	58	R Dashtestani, S Hojatpanah	Digital literacy of EFL students in a junior high school in Iran: voices of teachers, students and Ministry Directors	2022

Co-word analysis

This research identified a total of 47 keywords. The co-word analysis highlighted that the term 'digital literacy' emerged as the most frequently encountered keyword, with 245 occurrences. It was closely followed by the keywords 'School' (91 occurrences) and 'Literacy'

(69 occurrences). The top 15 co-word analysis keywords are presented in Table 4. Additionally, the network structure of keyword co-occurrence is visually represented in table 4, showcasing five distinct clusters that can be inferred to be closely interrelated. Based on these clusters, further discussions and elaborations were conducted.

Tabel 4. Top 15 keywords in the co-occurrence of keywords analysis of Digital Literacy in Elementary School.

No	term	occurrences	relevance score
1	digital literacy	245	0.5409
2	school	91	0.4323
3	literacy	69	0.4766
4	student	55	0.231
5	teacher	38	0.3307
6	development	32	0.1512
7	elementary school student	29	0.8187
8	digital literacy skill	28	1.1248
9	elementary school	27	0.5178
10	high school student	26	0.8782
11	child	25	0.5999
12	learning	25	0.1473
13	secondary school student	22	0.9136
14	middle school student	19	1.0996
15	primary school	19	0.438

In addition to utilizing POP software for keyword analysis, we also using VOSviewer software to analyze the keywords extracted from the articles obtained. The analysis was conducted within the POP software, which facilitated the identification of frequently occurring keywords and the subsequent mapping of the resulting network visualization. VOSviewer, a commonly used software in bibliometric research, was employed in this study to visualize and map the research data based on the existing networks. Specifically, the bibliometric analysis in this research utilized VOSviewer to analyze and visually represent the research on Digital Leadership in Education

Within the VOSviewer application, three types of mappings or visualizations are available: Network Visualization, Overlay Visualization, and Density Visualization. The initial mapping performed in this study focused on Network Visualization, where each item is represented by a circular label. The size of the label and circle associated with each item is determined by the weight assigned to that item. Consequently, items with higher weights are represented by larger labels and circles. Generally, items that are positioned closer together on the map indicate a stronger association between them.

Figure 2. shows the results of Network Visualization using VosViwer. From Figure 2, we can see how the relationship between each variable or keyword is interconnected, the

larger the circle, the more often research on this topic appears. From Figure 2 we can also see that there are seven clusters, each of which consists of red, green, blue, yellow, purple, light blue, and orange clusters.
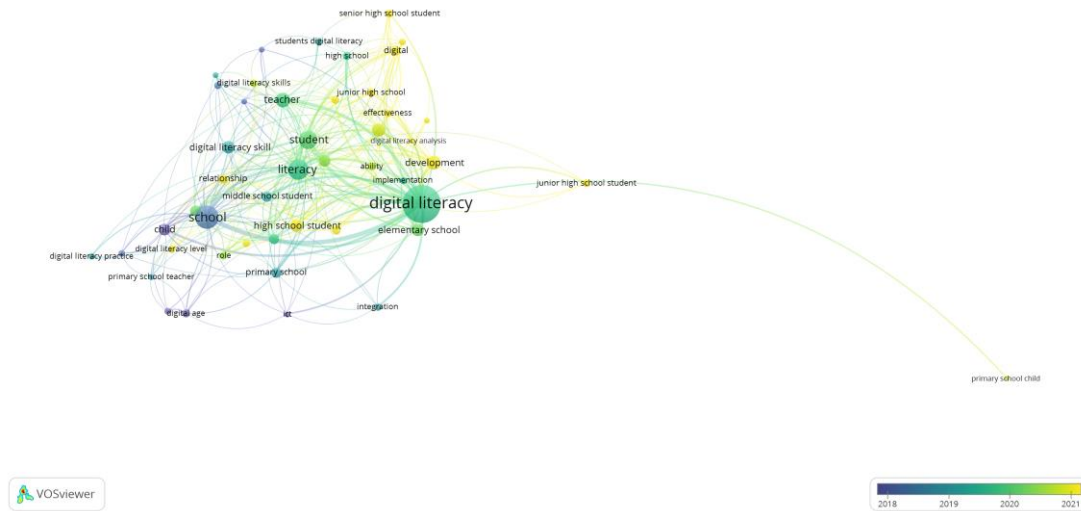

Figure 2. Network Visualization

4. CONCLUSION

This review sheds much light on the emerging field of research on digital literacy in Elementary Education. The practice of conducting systematic literature reviews using bibliometrics is widely accepted in other fields, such as social sciences and education, but is only beginning to gain traction in psychology. This literature review only included sources indexed by Google Scholar; any potentially relevant publications not indexed by Google Scholar were not included. It is also important to be aware of the limitations of the search string and inclusion/exclusion criteria with key terms. To facilitate interpretation of the results. The interpretability of the author's inductive reasoning determines the subjectivity of the classification of research themes. Depending on how these results are interpreted, one may come to different conclusions about the main findings of the study. Furthermore, because the search was conducted in May 2023, the dataset may not comprehensively cover articles published in 2022 and 2023. This limitation may result in an incomplete understanding of the latest trends and findings in the research area. This bibliometric review provides a unique and valuable new perspective on the topic of digital literacy in the context of Elementary Education. This study uses Trends and co-word analysis to survey scientific articles on digital literacy in the context of Elementary Education. There are a total of 517 publications taken from the GS database. The search limit in this study is from 2013 to 2023. From the results of the publication trend, more and more studies have been conducted on this topic since 2022, and this trend is expected to continue in the coming years, making this topic increasingly relevant to the current conditions of Elementary Education.

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