



## Research Trends and Network Analysis in Digital Literacy, Competencies, and Digital Skills: A Scientometric Analysis (2011-2025)

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### *Abstract*

Digital and information literacy is a multifaceted idea that includes a composite blend of knowledge, skills, and competencies, garnering more focus in the realm of higher education. This research intends to examine the scientific output regarding digital literacy from 2011 to 2025 utilizing the Scopus database and to emphasize existing research progress related to this area. A bibliometric study was performed to analyze multiple variables related to different characteristics, including the distribution of publications, the most productive countries, and the most prolific sources for publications. This analysis was followed by an examination of authors and country co-occurrence, utilizing Microsoft Excel and VOSviewer software. The findings reveal that the most commonly investigated subjects in digital and information literacy revolve around the incorporation of digital literacy, and the assessment of digital and information literacy effectiveness in educational methods.

**Keywords:** Digital Literacy, Information Literacy, Bibliometrics, Digital Skills, Digital Competencies

### **Introduction**

The application of digital and IT literacy in educational practices is growing swiftly across the globe (Benson & Kolsaker, 2015). Scholars are becoming more focused on examining the subject of digital literacy in contemporary higher education environments, given that technological, social, and cultural viewpoints are transforming the application of digital technologies in everyday life and professional settings (Martínez-Bravo, 2020). In the current landscape, digital literacy is crucial for university students. In the future, it will become increasingly important as you enter the workforce, where your digital knowledge and skills will be assessed. You must



engage with individuals in a virtual setting at your job, use information proficiently and work together to develop products leveraging new skills and insights. Primarily, as the digital landscape keeps advancing swiftly, it's essential to uphold your digital identity and overall well-being. Digital literacy is commonly viewed as a multifaceted concept that includes a sophisticated combination of knowledge, skills, attitudes, and thinking required for the confident, creative, and critical application of technologies and systems (Martin, 2006). This indicates that digital literacy encompasses various facets of life and entails the command of concepts rather than solely information and technical abilities (Janssen et al., 2013). Information and Communication Technology (ICT) encompasses technologies like computers, smartphones, and tablets, along with the various software applications these devices can operate, enabling us to access information and communicate with one another. The internet (commonly called the "web," despite the two terms having slightly distinct meanings) is a crucial part of ICT as it links millions of devices via a worldwide network. Understanding these technologies is crucial for executing all these tasks, which makes digital skills and literacy very significant. Due to its significance in a digital society, works concerning digital literacy have ignited both theoretical and practical debates. (Stoppa&Bartol, 2019) examined digital literacy in secondary education, recommending that various research narratives be integrated cooperatively. (Cabero-Almenara et al., 2021) investigated the digital skills of higher education instructors considering both their field and age group, and suggested possible measures to enhance the digital education of faculty members. Comparable research has been carried out to explore learners' digital literacy comprehensively. (Mehrvarz et al., 2021) investigated how digital literacy influences university students' digital learning and their self-assessed academic success, highlighting the crucial importance of digital skills and technology usage in informal digital learning (He & Li, 2019). Moreover, because of the expansion of the COVID-19 health emergency, conventional classroom instruction was halted, and there was a heightened demand for digital literacy during that period (Zhao et al., 2021). The emphasis on digital literacy has garnered significant attention, as it has helped higher education institutions function during these challenging times (Wang et al., 2022). Although research on digital literacy topics has already been conducted, limited attempts have been made to comprehensively review academic articles on digital & information literacy in higher education using bibliometrics methods. (Pachauri et al., 2025) Our objective is to examine the development of digital and information literacy, competencies and skills research in higher education from 2011 to 2025, aiming to assess the current state of digital literacy and provide a detailed overview of global digital literacy, competencies and skills through performance assessment and scientific mapping.

### **Methodology**

This study analyzes published articles worldwide related to trends, authorship patterns, and collaboration metrics in "digital literacy" or "information literacy," using qualitative methods and a literature review approach for analysis. Data was collected from the Scopus database, focusing on publications between 2011 and 2025 to capture recent developments. All articles were

specifically selected from Scopus to ensure high-quality, peer-reviewed content. The data sources used include relevant academic papers identified through source search terms: TITLE-ABS-KEY ("digital literacy" OR "information literacy" OR "digital competencies" OR "digital skills" OR "information competencies") AND PUBYEAR > 2010 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE,"ar" )). During the second phase, documents were selected for analysis, including only the article category, which yielded 19363 documents.

## Results and Discussion

### Yearwise Publication Trends

Figure 1 shows how many papers about digital literacy came out each year. It breaks down the number of articles published over the time we looked at. Even though there was a small dip in 2015 and 2017, overall, a lot more research has been published in recent decades. Starting in 2011, when 365 articles were published, the yearly output really took off. It's worth pointing out that 2025 had 4569 articles, making up 23.60% of all the research, which probably means people are paying a lot more attention to this area. Basically, digital literacy research has become a really most important topic since 2020, keeping pace with new ideas in how we teach and learn digitally. Looking at how the research has developed over time, it looks like this upward trend is likely to keep going.

**Table 1**  
**Publication Trends**

Year	No. of Paper	Percentage of Total Publication
2025	4569	23.60
2024	2821	14.57
2023	2065	10.66
2022	1850	9.55
2021	1487	7.68
2020	1186	6.12
2019	987	5.10
2018	716	3.70
2017	645	3.33
2016	669	3.46
2015	561	2.90
2014	579	2.99
2013	436	2.25
2012	427	2.20
2011	365	1.89
<b>Total</b>	<b>19363</b>	<b>100</b>

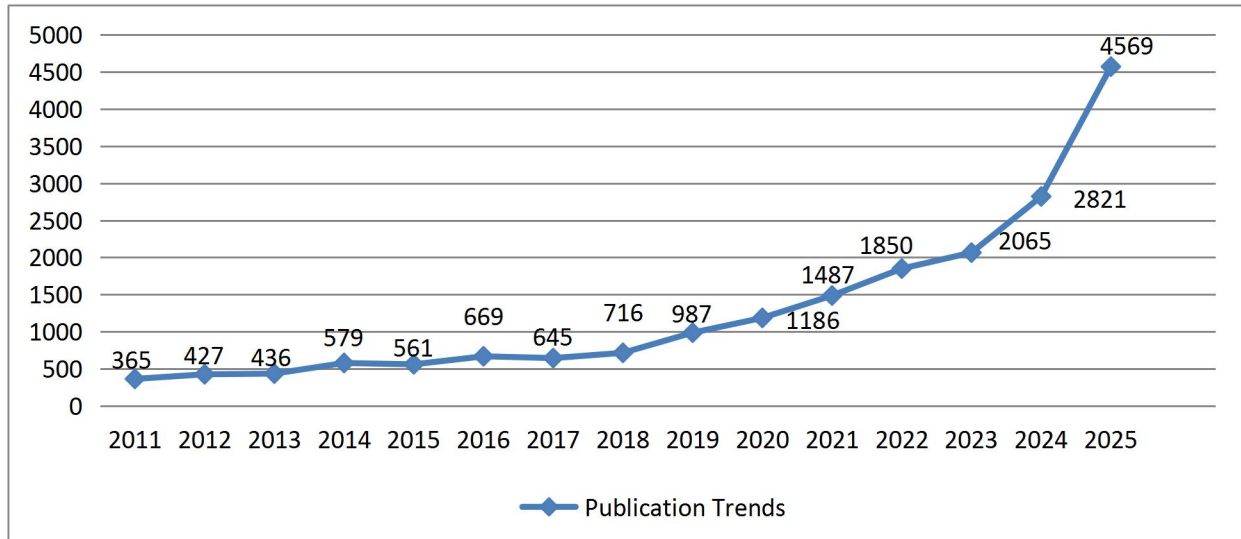


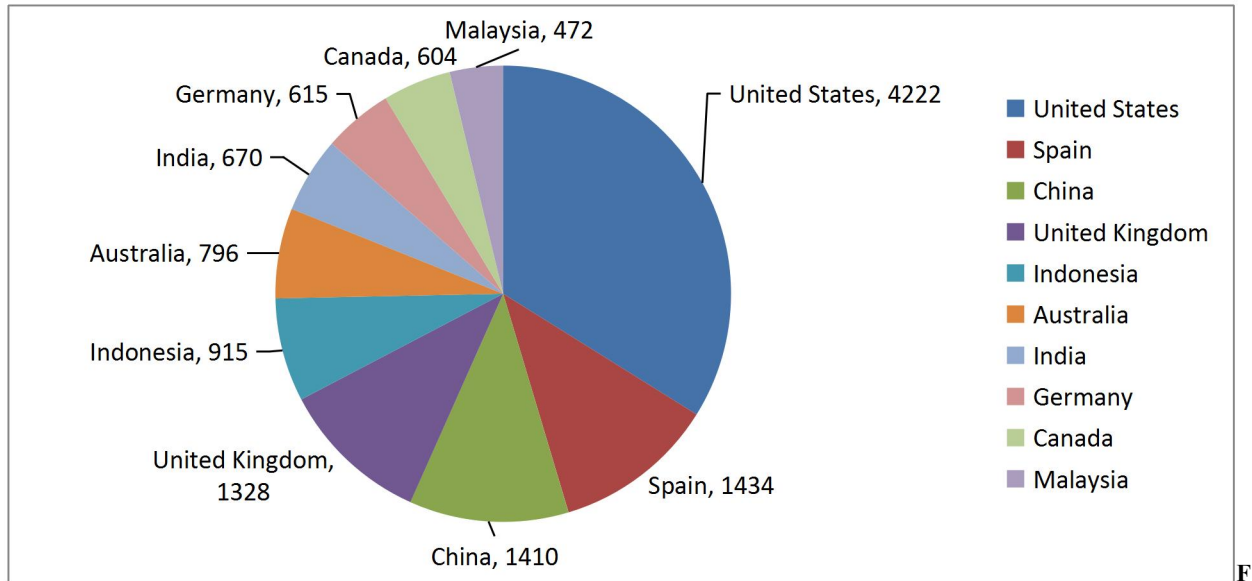
Fig. 1 Publication Trends

### Geographical Countries Distribution

The findings demonstrate that 160 nations contributed to research on digital literacy, skills, and competencies. Table 2 presents the countries with the highest productivity. The United States produced the highest volume of publications (21.81%), followed by Spain (7.40%), China (7.28%), and the United Kingdom (4.86%). Regarding prolific nations, the United States led with 4222 articles, followed by Spain (1434), China (1410), the United Kingdom (1328), and Indonesia (915).

Table 2  
 Countries Distribution

Rank	COUNTRY/TERRITORY	Total Publication	Percentage
1	United States	4222	21.81
2	Spain	1434	7.40
3	China	1410	7.28
4	United Kingdom	1328	4.86
5	Indonesia	915	4.73
6	Australia	796	4.11
7	India	670	3.46
8	Germany	615	3.18
9	Canada	604	3.12
10	Malaysia	472	2.44



ig. 2 Countries Distribution

### Publication Language

According to Table 3, English was the most frequently used language for papers published by the authors, accounting for 17,388 papers (89.80%), placing it in first position. Spanish was second with 859 papers, followed by Chinese in third place with 272 papers. Other languages followed in subsequent positions.

Table 3  
Language wise Distribution

S. No.	Language	No. of Publication	Percentage
1	English	17,388	89.80
2	Spanish	859	4.44
3	Chinese	272	1.40
4	Portuguese	252	1.30
5	Russian	180	0.93
6	German	95	0.49
7	French	46	0.24
8	Croatian	44	0.23
9	Italian	41	0.21
10	Persian	30	0.15

### Most Prolific Authors

The study on digital literacy involved a total of 50,398 authors. Table 4 shows the ten most productive authors who have published articles in this field. Pinto, M. led the way with 51

articles, and his work primarily focused on how to effectively utilize digital competencies. Hicks, A., who were second with 31 articles, focused on analyzing unique aspects of digital literacy and how skills are evolving. Lloyd, A., in third place with 28 publications, wrote about how developing digital skills should be a top priority in education. Similarly, Tomczyk, Ł.; Aguaded, I.; and Elizalde, V. shared the 8th position, each having published 22 papers. Palacios-Rodríguez, A.; Guillén-Gámez, F.D.; and Bruce, C.S. each published 20 papers, securing the 9th position, followed by MarzalGarcía-Quismondo, M.A. and Uribe-Tirado, A., who shared the 10th position with 19 publications each.

**Table 4**  
**Top Productive Authors**

Rank	Authors Name	No. of paper
1	Pinto, M.	51
2	Hicks, A.	31
3	Lloyd, A.	28
4	Naveed, M.A.	26
5	Julien, H.E.	25
6	Alexander J.A.M.	24
7	Cabero-Almenara, J.	23
8	Tomczyk, Ł.	22
8	Aguaded, I.	22
8	Elizete, V.	22
9	Palacios-Rodríguez, A.	20
9	Guillen-Gamez, F.D.	20
9	Bruce, C.S.	20
10	MarzalGarcía-Quismondo, M.A.	19
10	Uribe-Tirado, A.	19

### Top Most Sources

Table 5 lists the top 10 publication sources along with their number of publications and impact factors. These journals produced 1952 publications, accounting for 10.08% of overall output. The top 3 journals with the most articles published in the field are Journal of Academic Librarianship (281 articles), Library Philosophy and Practice (263), and Sustainability Switzerland (254). Overall, the findings suggest that the publication sources associated with library and information science and education science and technology have focused primarily on research concerning digital and information literacy.

**Table 5**  
**Top Most Sources**

Rank	Source Name	No. of Publication	Source Impact Factor
1	Journal of Academic Librarianship	281	1.627
2	Library Philosophy and Practice	263	0.244

3	Sustainability Switzerland	254	1.113
4	Journal of Information Literacy	210	0.938
5	Reference Services Review	186	1.284
6	Education and Information Technologies	182	2.689
7	Communications in Information Literacy	181	0.946
8	Education Sciences	142	1.411
9	Journal of Medical Internet Research	134	1.96
10	Journal of Librarianship and Information Science	119	1.45

### Co-Authorship Network

In this figure, there is the co-authorship relationship between different researchers. Each node represents an author, and the links between them indicate who the authors have worked together to produce research. The collaboration habits of authors are grouped into clusters of different colors, indicating which authors are on the same research team. As an example, the pink group includes Pinto, M.; and Fernández-Pascual, Rosaura M. who is close allied with sky blue group in which include Machin-Mastromatteo, Juan D and light green group Sales, Dora. Green cluster comprises such authors as García-Ruiz, and Aguaded, Ignacio who work together frequently. Similarly, red group includes Casarin, Helen Castro Silva; Dos Santos, Carolina Arnaut and Ottonicar, Selma LeticiaCapinzaik. This network structure indicates the networks and affiliations of the researchers, as well as the authors who are collaborating frequently with other researchers. This research paper is very useful to understand the nature of research affiliations in a particular institution or discipline.

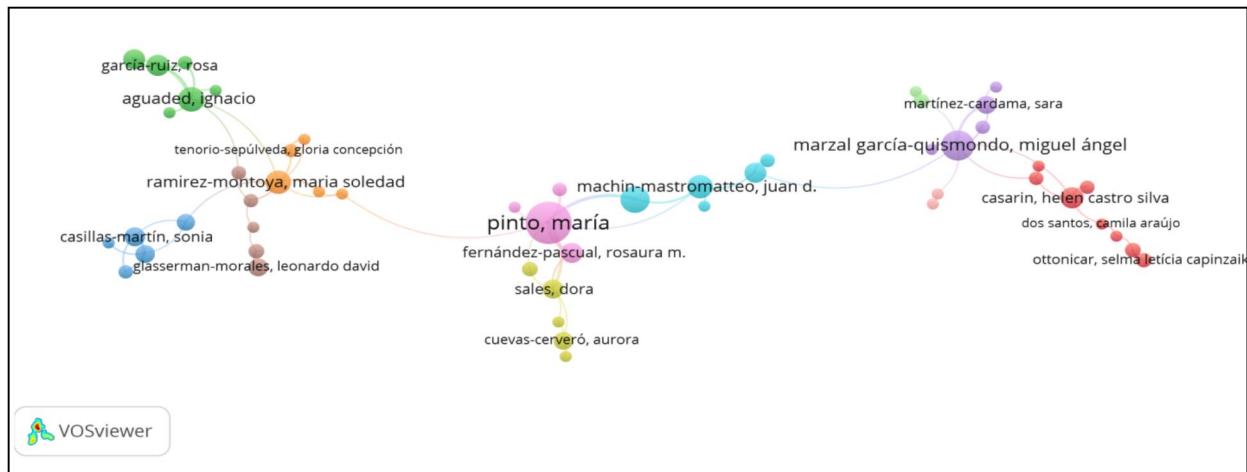


Fig. 3 Co Authorship Network

### Co-occurrence Keywords-Author

Figure 4 shows an overlaid concept of the distribution of author keywords according to keyword co-occurrence over a four-year period. The prevalent concepts in the network map over a specific average time period were labeled with different colors. Green indicates keywords that

appeared earlier and were dominant, such as "information literacy" and "library instructions," while light green keywords indicate those that appeared later and were dominant, such as "digital literacy," "higher education," and "secondary education." The red cluster primarily consisted of keywords focused on "health literacy" and "health information." The blue cluster was dominated by keywords such as "digital transformation" and "digital economy." The purple cluster was closely connected to both the blue and green clusters, with keywords such as "critical analysis" and "instructional technology" being dominant.

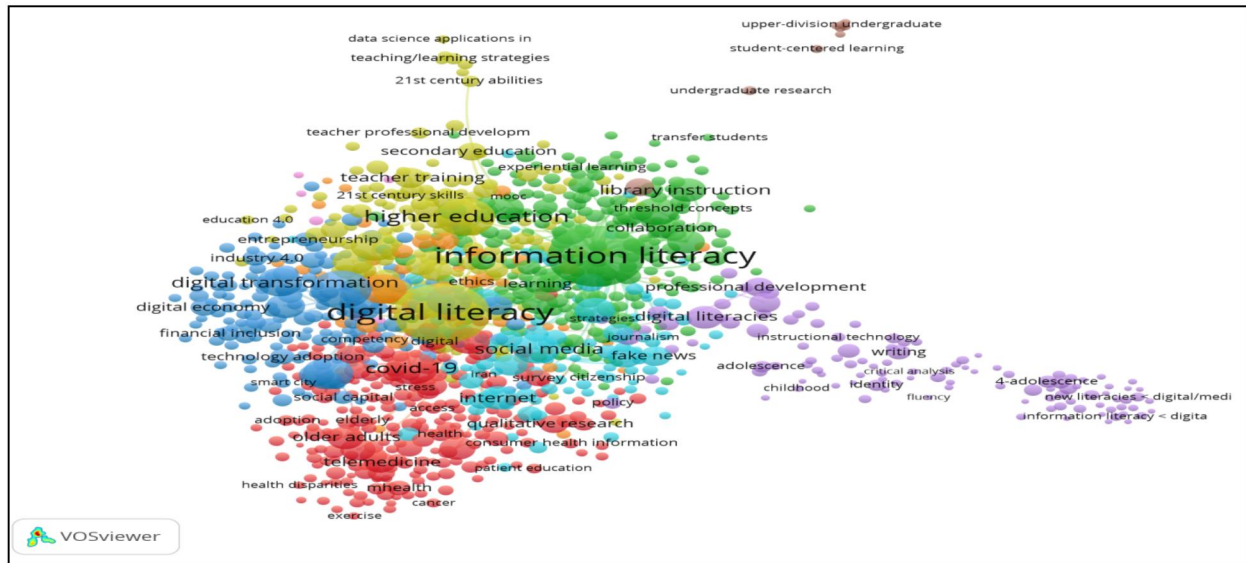


Fig. 4 Co-occurrence Author Keywords

### Country Wise Co-authorship Network

Fig. 6 shows the collaboration network map among countries. A total of 121 countries were recognized using a cutoff of 5 documents for each nation, organized into three primary clusters represented by various color schemes. Notably, the clusters represent the USA alongside various Asian and European nations in one group, the China and other Asian nations in another group, similarly Spain and other African countries represent third group. Data shows that the USA excels in collaboration strength, whereas the China and Asian countries exhibit broader collaboration.

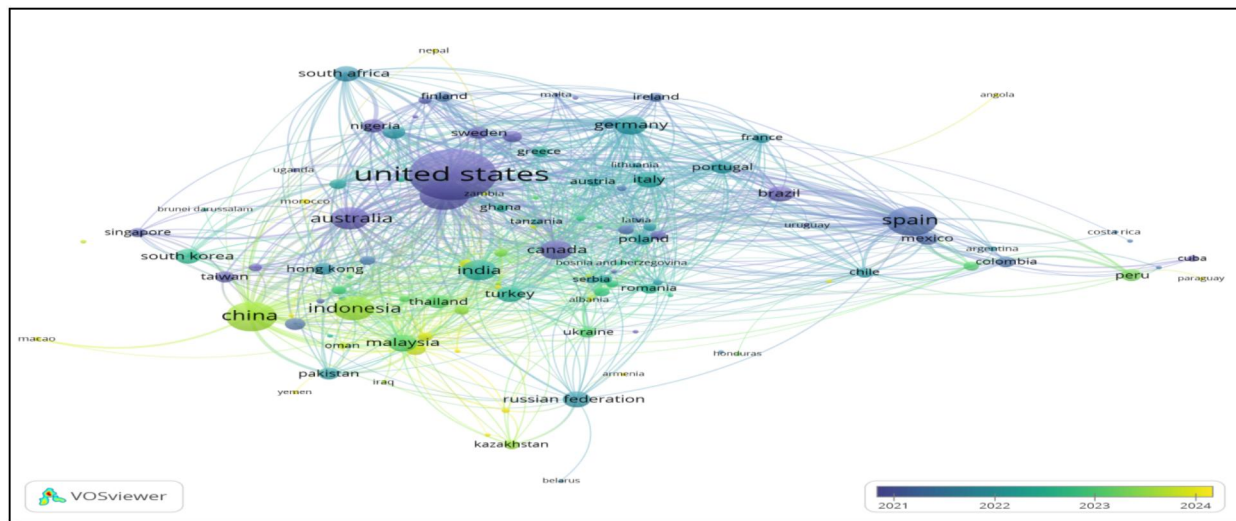


Fig. 4 Country Wise Co-authorship Network

## Conclusion

In recent decades, there has been an increasing focus on matters concerning digital literacy, skills, and information literacy research within higher education. Between 2015 and 2017, there was a decline in the output of research on digital and information literacy, but saw a significant rise in the subsequent six years, from 2020 to 2025. USA, Spain and China regions were at the forefront with a significant volume of publications. Research on digital literacy mainly concentrated on education, information, knowledge, and technology sectors. Furthermore, as evidenced by the authors' publications, they have made the most significant contributions to the topic of digital and information literacy; with author M. Pinto writing 51 articles, Alison Hicks writing 31 articles, and A. Lloyd writing 28 articles during the period under review. The keyword co-occurrence findings indicated that "digital literacy," "higher education," "information literacy," and "digital transformation" ranked among the most commonly used keywords. In summary, the results of this study can assist researchers in acquiring a thorough understanding of digital literacy pinpoint the most discussed topics within the field, and offer direction and context for subsequent research.

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