Journal of Infrastructure, Policy and Development 2024, 8(12), 8492.
https://doi.org/10.24294/jipd.v8i12.8492

Article

Research trends in digital citizenship: Bibliometric mapping from web of science

Nubia Yaneth Gómez Velasco[1,3,*], Julieth Katherine Rodríguez Gutierrez[2,3], Orlando Gregorio Chaviano[4]

[1] Escuela de Matemáticas, Universidad Pedagógica y Tecnológica de Colombia, Tunja 150003, Colombia
[2] Facultad de Ciencias y Humanidades, Universidad de América, Bogotá 111711, Colombia
[3] Grupo de Estadística Gamma, Universidad Pedagógica y Tecnológica de Colombia, Tunja 150003, Colombia
[4] Departamento de Ciencia de la Información, Facultad de Comunicación y Lenguaje, Pontificia Universidad Javeriana, Bogotá 110231, Colombia
*** Corresponding authors:** Nubia Yaneth Gomez Velasco, nubia.gomez@uptc.edu.co

CITATION

Gómez Velasco NY, Rodríguez Gutierrez JK, Chaviano OG. (2024). Research trends in digital citizenship: Bibliometric mapping from web of science. Journal of Infrastructure, Policy and Development. 8(12): 8492.
https://doi.org/10.24294/jipd.v8i12.8492

ARTICLE INFO

Received: 8 August 2024
Accepted: 3 September 2024
Available online: 4 November 2024

Abstract: Digitalization has recently gained significant relevance in the education field. The focus has been on its use and application, as well as on training teachers and students to become responsible, competent, and ethical users of technology. This is connected to the creation of policies and programs that promote online learning and interaction from basic to higher education. In this context, this study aims to analyze the scientific production related to digital citizenship through a bibliometric mapping of publications indexed in the Web of Science database. The goal is to identify the main research trends in this field. The results show a growth in the number of publications since 2016, mainly focusing on topics such as digital citizenship media, digital competences, higher education, teachers, students, adolescents, adults, competence, digital literacy, and citizenship education. The presence of a significant number of journals related to the field of education denotes a close relationship between this field and the topic of study. Also, it is revealing a higher concentration of research production in the United States and Europe, with Latin America being absent from this scenario. The study identifies an intellectual structure of the discipline, particularly regarding the most relevant authors, journals, and descriptors. These results are important for understanding the research practices inherent to the field, which projects digital citizenship as an emerging topic. The study concludes by proposing lines of interest for further research on the topic in education and other fields, as well as acknowledging the limitations found in the present article.

Keywords: digital citizenship; scientific production; scientific structure; bibliometric analysis; bibliometrics

1. Introduction

In recent decades, there has been an increase of interest in digital technologies across various sectors (Pathak-Shelat and Bhatia, 2019). This phenomenon can be attributed to factors such as technological advancements, increased accessibility, and the growing role of technology in national development (Van Bavel et al., 2004).

As Chan and Yuen (2014) posts, the digital environment fosters a dynamic landscape that, in educational contexts, cultivates environments that promote digital citizenship across multiple domains. Digital citizenship education encompasses the development of technological skills and responsible behaviors in social, health, and economic sectors (Petersen et al., 2019; Wang and Xing, 2018), as well as within school settings, educational policy (Beghetto and Kaufman, 2009; Hui and Lau, 2010), and school-based initiatives (Weinstein and James, 2022).

On the other hand, Perkins and Tishman (2006) explored learning towards dispositional perspectives of education and research needs. Lenhart (2015) focuses on young people's interests in technology and their social environment; while Gardner and Davis (2013) look into youth issues such as identity and intimacy.

From the perspective of public or administrative management, Mossberger et al. (2008) argue that the 21st century requires greater participation in digital citizenship, motivated by public policies that address educational and technological gaps. In this regard, UNESCO emphasizes the importance of digital skills in employment and social inclusion processes (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2018). Colombia has incorporated the issue of digital citizenship into its National Development Plan 2018–2022 (Ley 1955 de 2019, Articulo 147), with cross-cutting strategies for a digital transition connected to the knowledge era and the relationship between government, businesses, and households.

The scope of digital citizenship is also addressed from the perspective of technological surveillance and bibliometrics (Domínguez-Delgado and López-Hernández, 2020). However, the scientific literature does not show abundant bibliometric studies related to the topic. In this regard, there is production at the Ibero-American level in educational aspects (Rendón Gil and Angulo Armenta, 2022) and research on social networks as a network citizen (Fernández-Prados et al., 2020), showing an increase in scientific output and productivity since 2016 (Palaz et al., 2022).

Bibliometrics as an instrumental discipline, allow the study of scientific domains (Glänzel, 2012) based on indicators that help to understand research practices (Bornmann, 2020; Moed, 2000). There are also techniques to map the intellectual base of disciplines (De Bellis, 2009), such as co-citation, which analyzes the structures of knowledge domains (Marshakova-Shaikevich, 1973; Small, 1973) and helps to determine the existing links between contents and concepts (Arencibia et al., 2020), where it is necessary to mention the co-citation of authors (White and Griffith, 1981) and journals (McCain, 1991). Likewise, bibliographic coupling (Kessler, 1963) shows the existing relationships between bibliographic units from the joint appearance of references in the texts (Jarneving, 2005), which, similarly to co-citation, makes it possible to know and study disciplinary research fronts.

Furthermore, social relationships expose connections and collaborative networks (Glänzel, 2002) and in which co-authorship is a primary expression of collaboration (Olivera Batista et al., 2018), while, the co-occurrence of terms or co-words identifies, describes and represents conceptual or thematic structures and relationships (Romero-Pérez and Pulido-Rojano, 2018), being useful as a support for the evaluation of trends and emerging themes in a scientific domain.

Digital citizenship. Perspectives and conceptual approaches

The concept of digital citizenship currently encompasses a variety of approaches, undergoing a process of continuous change and evolution. This dynamism is likely attributed to its inherent connection with the ever-evolving technological landscape of communication and information. As it is posited by Ribble and Bailey (2015), "digital" stands for a constellation of skills and dispositions that individuals possess in relation to the technological media they interact with. On the other hand, "citizenship," in its broadest sense, refers to the status of being a member of a community. Expanding on

this definition, James et al. (2021) define a digital citizen as an individual who actively inhabits and participates within a digital world. This participation entails a recognition of the complexities embedded in the use of technological media within the context of social and political engagement.

International organizations conceptualize digital citizenship as a competent engagement with technologies, which enables and facilitates digital activities for citizens in areas such as work, communication, socialization, and research, among others, with responsible participation in various communities (Council of Europe, 2021). An active digital citizen should engage and generate learning with the digital in political, economic, social, and cultural spheres. Mossberger et al. (2008) defines digital citizens as those who are connected every day, recognize the benefits of the internet, and the multiple opportunities it provides for citizens in various forms of communication.

The Economic Commission for Latin America and the Caribbean (ECLAC) acknowledges the incorporation of the concept of digital citizenship into public policy and academic discussions. They conceptualize it as a set of initiatives and actions that aim to adapt and transform practices, norms, and values associated with "citizenship, the public sphere, and/or the social" in order to respond to the challenges of the digital society (Claro et al., 2021, p. 6).

These conceptual approaches demonstrate the array of skills that a digital citizen must possess. However, Perkins and Tishman (2006) argue that these skills alone are insufficient. Individuals also require dispositions to enact change or acquire other competencies, which can be hindered by biases and prejudices. These competencies are embedded within the fabric of society and, according to Davis (2017), need to be redirected towards processes of learning citizenship within the digital realm. Ribble and Park (2019) emphasize the importance of digital citizenship education as a complementary aspect in the classroom that should reinforce students' character development and ethics.

Digital citizenship closely aligns with digital literacy and media education, converging with formal and informal learning contexts (Sanabria Mesa and Cepeda Romero, 2016). These are considered crucial for understanding communication technologies and social networks (Rendueles Menéndez de Llano, 2016). When studying and analyzing the concept of digital citizenship, the role of public libraries as spaces for citizen training in the digital sphere becomes particularly relevant (Vera-Baceta and Gómez-Hernández, 2021).

Likewise, UNESCO proposes a three-level framework for conceptualizing digital citizenship: subject as receiver, participant, and active actor. Within each level, individuals should be able to identify both the opportunities and risks associated with digital technologies (Cobo, 2019). Additionally, there is a need for a greater focus on educational research lines and the strengthening of digital literacy (Rendón Gil and Angulo Armenta, 2022). Örtegren (2022) and James et al. (2021) emphasize the importance of using digital technologies in an ethical, responsible, secure, and robust manner. Other relevant aspects include the critical perspective and inclusion of digital technologies in teaching spaces and practices (Villar-Onrubia et al., 2022), the social potential of information and communication technologies, the role of digital citizenship education, and its democratic nature (Yue and Beta, 2022).

Within this context, given the diversity of conceptual approaches, it can be stated that there are multiple perspectives and focuses on digital citizenship. In terms of Kozbelt et al. (2010) discussion of creativity, this could be considered a pluralistic theory, allowing for a more complete understanding of this new social movement known as digital citizenship. Given the current relevance of digital citizenship as a research topic and its social importance in changing educational environments, this article aims to evaluate the research on digital citizenship registered in Web of Science (WoS) based on bibliometric indicators of production, impact and collaboration, as well as techniques that help determine its trends and social, conceptual, and intellectual structure. The goal is to understand the practices and behaviors of research in digital citizenship and to offer information to researchers, as well as to propose future lines of research to the specialized scientific community.

The article is structured in three fundamental sections. The first section focuses on the theoretical review, where an approach is made to the concepts, theories and background of digital citizenship. The second section describes the methodology used, including the process of information search and retrieval, data cleaning and normalization, as well as the techniques used in the processing and analysis. The third section presents the results of the study, together with the conclusions and a discussion of them. The study is based on the analysis of various bibliometric indicators selected to fulfill the stated objectives.

2. Materials and methods

The methodology was addressed in three sections: 1) population and sample, where the process of searching, cleaning and standardization of the data is indicated; 2) data instruments, in which the source of information used is specified; 3) data collection and analysis procedure, where the type of research approach and techniques applied are described.

2.1. Population and sample

A comprehensive search was conducted in the selected databases using the term “digital citizenship” as the main descriptor. The study period covered the years 2004 to 2022, yielding a total of 415 documents in the initial search and retrieval phase.

Subsequently, a meticulous process of review, refinement, and cleaning of the results was carried out. Cleaning consisted of eliminating duplicates of document titles, including those with slight variations in the titles or versions in different languages, such as Spanish and English, to avoid duplication in the analysis. Regarding standardization, the names of authors, institutions and journals were standardized to ensure consistency in the data and avoid unnecessary fragmentation. Likewise, in the word cloud, similar terms were consolidated as plurals and singulars (e.g., “technology” and “technologies”), which allowed a more accurate representation of key concepts. This stage was crucial to ensure the relevance of the documents to the research topic and to obtain an accurate dataset that would allow for further analysis. As a result of this process, 331 scientific articles were selected that met the established criteria. **Figure 1** shows the methodological process that we carried out following the above.

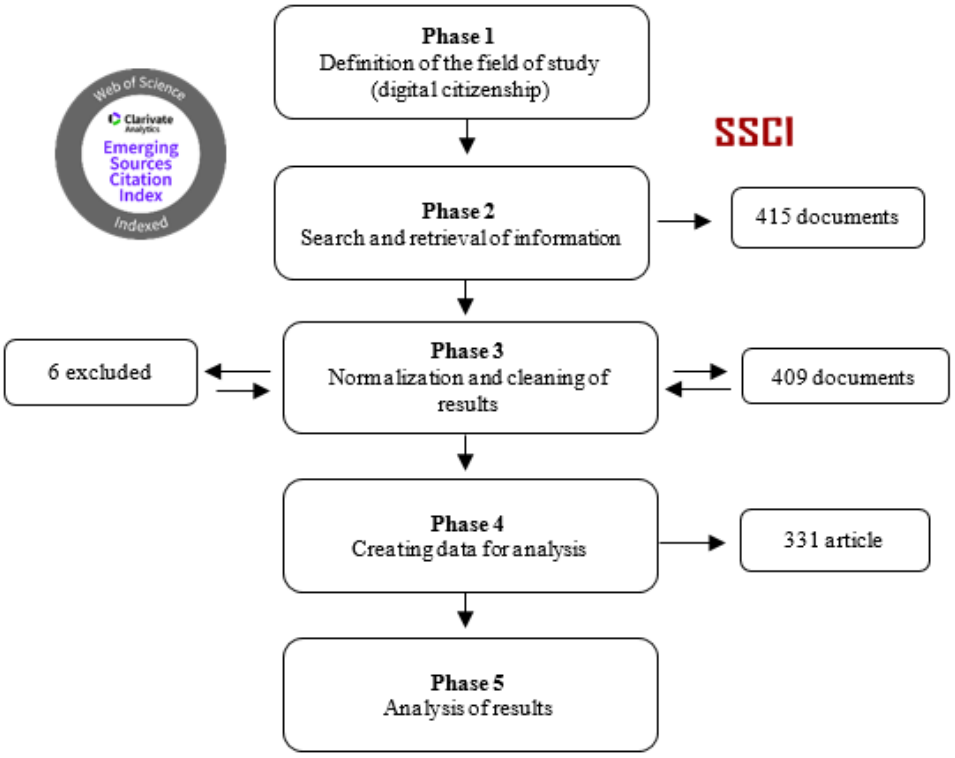


Figure 1. Description of the information search, recovery and cleaning process.

To facilitate the work of tabulation, analysis, and visualization of the information, the data was organized into three files: one in Microsoft Excel format and two in .csv and. bib format. Additionally, specialized tools such as VoSViewer (Van Eck and Waltman, 2010) and Biblioshiny (Aria and Cuccurullo, 2017) were used to create maps and networks that allowed visualizing the different dimensions of the field of study.

2.2. Data instruments

This is the main source that collects research published by a considerable and important number of journals and offers bibliometric information on different variables and units of analysis. Specifically, the Social Science Citation Index (SSCI) and the Emerging Sources Citation Index (ESCI) were used. Although the source of information has limitations related to the coverage of the Social Sciences and Humanities, and geographical biases, the quality of the journals it indexes allows for the evaluation of quality information and offers important results for understanding the disciplines.

2.3. Data collection and analysis procedure

This research was developed under a mixed approach, employing quantitative and qualitative methods, seeking a better understanding of the data collected (Hernández Sampieri and Mendoza, 2018). Quantitatively, bibliometric indicators of production, impact and collaboration were used to understand the scientific activity, research dynamics and collaboration in the subject (Donthu et al., 2021; Romaní et al., 2011). Likewise, these techniques made it possible to study the social, conceptual and

intellectual structures of the field (Boyack and Klavans, 2010; Ding et al., 2001), completing the mapping in **Table 1**, and highlighting trends or developments leading to new fields of study. Qualitatively, a time-period analysis was performed by applying retrospective longitudinal exploratory techniques to determine relevant characteristics in the subject of study, using systematic criteria, patterns, behaviors, structures and trends (Levin and Rubin, 2004).

Table 1. Description of indicators used in the research process by dimensions.

Dimension	Indicators	Description
Production	Number of documents by year. Journals with the highest number of contributions.	These allow to know trends of the thematic research output in Web of Science and selected period.
Impact	Number of citations per year. Impact factor and quartile of the journals. Ranking of cited papers.	These help to know the impact of the contributions from the citations received as an essential aspect of the research process.
Collaboration	Co-authorship index. Institutional and country collaboration network.	This are used to learn about the ways in which the actors involved in the thematic research process are organized, in addition to visually displaying the main existing working relationships.
Social, intellectual and thematic structure	Co-authorship, bibliographic coupling, co-words and co-citation.	Techniques that make it possible to study the intellectual (coupling and co-citation) and conceptual (co-words) structure and provide key inputs on research practices. The maps constructed using VOSviewer and Biblioshiny allowed the mapping of research dimensions.

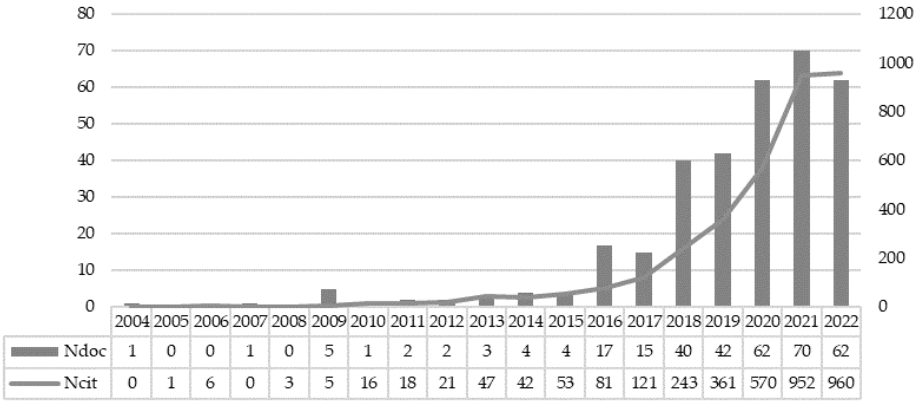
Source: Own elaboration.

3. Results and discussion

The analysis of the evolution of productivity in the field of digital citizenship reveals a steady increase in the number of publications between 2004 and 2022, with a marked acceleration after 2016. Notably, approximately 50% of all publications in the field were published in the last two years.

As it is shown in the **Figure 2**, it can observe the evolution of publications on digital citizenship visible in the WoS database, as well as the number of citations received. It is evident that these publications receive a considerable number of citations, with a growing trend, especially after 2017. This trend reflects the cumulative effect of documents published in the early years of the analysis period.

Two distinct stages can be identified within the study period. The first stage, from 2004 to 2012, saw the emergence of the topic in Web of Science journals, with a relatively low number of citations. The second stage, from 2013 onwards, witnessed a significant increase in the number of contributions, partly due to the growing relevance of the topic and the increasing number of journals dedicated to it.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Ndoc	1	0	0	1	0	5	1	2	2	3	4	4	17	15	40	42	62	70	62
Ncit	0	1	6	0	3	5	16	18	21	47	42	53	81	121	243	361	570	952	960

Figure 2. Evolution of publications on digital citizenship visible in the WoS.

To gain insights into the collaborative nature of research in the field of digital citizenship, the annual co-authorship index (IC) was analyzed for all publications on the topic (**Table 2**). Only scientific articles were considered for this analysis.

Table 2. Co-authorship rate by year.

Year	No. Signing authors	Ndoc	Co-authorship index (IC)
2004	7	1	7.0
2007	3	1	3.0
2009	5	5	1
2010	3	1	3.0
2011	2	2	1
2012	3	2	1.5
2013	12	3	4.0
2014	10	4	2.5
2015	11	4	2.8
2016	23	17	1.4
2017	42	15	2.8
2018	92	40	2.3
2019	97	42	2.3
2020	153	62	2.5
2021	174	70	2.5
2022	154	62	2.5
Grand Total	791	331	2.4

Source: Own elaboration.

The results show that between 2004 and 2022, approximately 24% of articles were published with a single author, indicating that these were produced without collaboration. The remaining 76% of publications had two or more authors (with two of these having 13 authors), with an average of 2.5 authors per published document, which is in line with the trend in the social sciences.

A total of 791 signatures were recorded for the 331 articles, corresponding to 759 distinct authors. Of these, 89% are considered transient authors, meaning that they

have only published once during the entire study period ($x = 0$). Only 11% are considered medium producers ($x < 1$), with each author having published between 2 and 5 articles during the analyzed period. This classification was made according to Lotka's productivity index (Rodríguez Gutiérrez et al., 2017).

Regarding publication channels, the research output is registered in a total of 229 scientific journals. It is worth noting the limited presence of sources from Latin America, even considering the inclusion of the emerging journals index. **Table 3** shows the journals that have published 5 or more articles on the central topic of study, including their WoS index, category and quartile, as well as the impact factor for the last reported year (2021) for those belonging to the SSCI index. Values are not included for journals in the emerging index.

The results show that the majority of journals are categorized as Education & Educational Research. Additionally, 77.8% of the journals are indexed in the JCR collection, which provides impact factors. The remaining journals are included in the emerging index and will not be assigned a quartile based on impact factor until 2024.

Table 3. Main journals in which publications on the topic studied are recorded.

Journal	Documents		Articles		Index WoS	Category WoS	Quartile JIF
	n	%	n	%			
Journal Of E-Learning and Knowledge Sociemmrty	13	3%	11	3%	ESCI	Education & Educational Research	
International Journal of Communication	12	3%	12	4%	SSCI	Communication	Q4
Educational Technology & Society	10	2%	9	3%	SSCI	Education & Educational Research	Q2
Citizenship Studies	9	2%	3	1%	SSCI	Political Science	Q3
Education And Information Technologies	8	2%	5	1%	SSCI	Education & Educational Research	Q1
International Journal of Environmental Research and Public Health	6	1%	6	2%	SCI-E	Public, Environmental & Occupational Health Public, Environmental & Occupational Health Environmental Sciences	Q1 Q2 Q2
Information Communication & Society	6	1%	4	1%	ESCI	Communication Sociology	
Learning Media and Technology	5	1%	3	1%	SSCI	Education & Educational Research	Q1
Sustainability	5	1%	5	1%	SCI-E	Environmental Studies Green & Sustainable Science & Technology Green & Sustainable Science & Technology Environmental Sciences	Q2 Q4 Q3 Q2

Source: Own elaboration.

Of the 331 articles analyzed, 30% have not been cited, 46% have received between 1 and 10 citations, and the remaining 24% have received more than 10 citations, as reflected or counted in all Web of Science collections. 5% of the published articles have 50 to 100 citations, and 3 articles have more than 100 citations.

Table 4 shows a list of the most cited or high-impact articles, identifying the article title, number of citations, publication year, journal name, and authors of the contribution. It is worth noting the diveSrsity of journal approaches and topics related to digital citizenship in this indicator.

An important aspect in thematic research mapping is the evaluation of topics through a strategic diagram represented in a four-dimensional map: driving themes (top right quadrant), important for structuring and developing the research field; emerging themes (bottom left quadrant), research lines still weak and with limited presence within the field; niche themes (top left quadrant) and basic themes (bottom right quadrant), those not sufficiently developed but could be relevant in the future for the thematic scope (**Figure 3**).

Table 4. Articles with the highest number of citations (minimum 50 citations).

Article title	Ncit	Year	Journal	Authors
The digital entrepreneurial ecosystem	232	2017	Small Business Economics	Sussan, Fiona; Acs, Zoltan J.
Informal learning and identity formation in online social networks	211	2009	Learning Media and Technology	Greenhow, Christine; Robelia, Beth
Defining and measuring youth digital citizenship	104	2016	New Media & Society	Jones, Lisa M.; Mitchell, Kimberly J.
Sexual Violence in the Digital Age: The Scope and Limits of Criminal Law	98	2016	Social & Legal Studies	Henry, Nicola; Powell, Anastasia
Intermediaries and Hate Speech: Fostering Digital Citizenship for Our Information Age	91	2011	Boston University Law Review	Citron, Danielle Keats; Norton, Helen
Exploring the relationships between learning styles, online participation, learning achievement and course satisfaction: An empirical study of a blended learning course	90	2016	British Journal of Educational Technology	Cheng, Gary; Chau, Juliana
Political Communication-Old and New Media Relationships	89	2009	Annals of The American Academy of Political and Social Science	Gurevitch, Michael; Coleman, Stephen; Blumler, Jay G.
The digital turn in postcolonial urbanism: Smart citizenship in the making of India's 100 smart cities	85	2018	Transactions of The Institute of British Geographers	Datta, Ayona
The Prevalence of Sexting Behaviors Among Emerging Adults: A Meta-Analysis	68	2020	Archives of Sexual Behavior	Mori, Camille; Cooke, Jessica E.; Temple, Jeff R.; Ly, Anh; Lu, Yu; Anderson, Nina; Rash, Christina; Madigan, Sheri
Trolling as provocation: YouTube's agonistic publics	67	2014	Convergence-The International Journal of Research into New Media Technologies	McCosker, Anthony
What it means to be a citizen in the internet age: Development of a reliable and valid digital citizenship scale	66	2017	Computers & Education	Choi, Moonsun; Glassman, Michael; Cristol, Dean
The Digital Entrepreneurial Ecosystem-a critique and reconfiguration	61	2019	Small Business Economics	Song, Abraham K.
Are social bots a real threat? An agent-based model of the spiral of silence to analyze the impact of manipulative actors in social networks	61	2019	European Journal of Information Systems	Ross, Bjoern; Pilz, Laura; Cabrera, Benjamin; Brachten, Florian; Neubaum, German; Stieglitz, Stefan
Measuring Digital Citizenship: Mobile Access and Broadband	61	2012	International Journal of Communication	Mossberger, Karen; Tolbert, Caroline J.; Hamilton, Allison
Digital Citizenship with Social Media: Participatory Practices of Teaching and Learning in Secondary Education	58	2018	Educational Technology & Society	Gleason, Benjamin; von Gillern, Sam

Table 4. (*Continued*).

Article title	Ncit	Year	Journal	Authors
Digital citizenship - Parameters of the digital divide	57	2004	Social Science Computer Review	Shelley, M; Thrane, L; Shulman, S; Lang, E; Beisser, S; Larson, T; Mutiti, J
Towards a radical digital citizenship in digital education	56	2019	Critical Studies In Education	Emejulu, Akwugo; McGregor, Callum
The Advent of Surveillance Realism: Public Opinion and Activist Responses to the Snowden Leaks	53	2017	International Journal of Communication	Dencik, Lina; Cable, Jonathan
Digital citizenship among ethnic minority youths in the Netherlands and Flanders	51	2007	New Media & Society	D'Haenens, Leen; Koeman, Joyce; Saeys, Frieda
Fostering teacher's digital competence at university: The perception of students and teachers	51	2020	RIE-Revista de Investigación Educativa	Domingo-Coscollola, María; Bosco, Alejandra; Carrasco Segovia, Sara; Sánchez Valero, Joan-Anton
Surveillance Culture: Engagement, Exposure, and Ethics in Digital Modernity	50	2017	International Journal of Communication	Lyon, David

Source: Own elaboration.

This mapping helped understand how descriptors are represented in scientific production according to their trend, which also exposes their relevance. The information is primarily visualized based on density (node size) and centrality (central position in the network) for terms grouped in the four sectors. It is important to highlight the relevance of driving terms, those most used in scientific production and visualized in the top right corner, among which stand out: digital citizenship, digital literacy, and digital competence, directly related to the topic at hand.

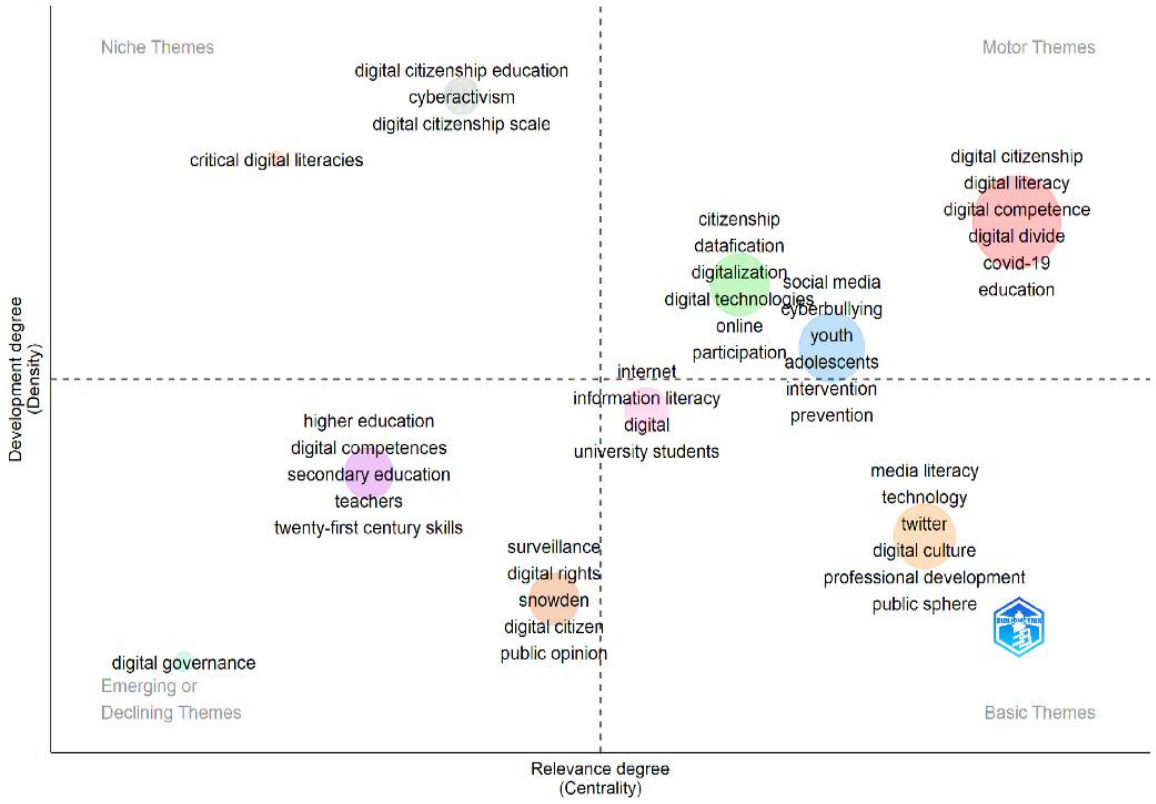


Figure 3. Thematic map on digital citizenship.

Source: Developed from biblioshiny.

Similarly, the analysis of descriptors related to digital citizenship is presented in an "overlay" map, which allows for understanding the use or appearance of descriptors within the analyzed time period, showing eight clusters or groupings. It has been decided to maintain the central term of study (digital citizenship) to observe the terms surrounding it such as social media, gender, skill, media literacy, and others equally close to the subject at hand. Regarding their appearance by years, terms like covid-19, cites, e-participation, new media literacies stand out in the most recent stage, which to some extent exposes the shift of research to current issues, important for a better understanding of digital citizenship and the future configuration of new proposals (**Figure 4**).

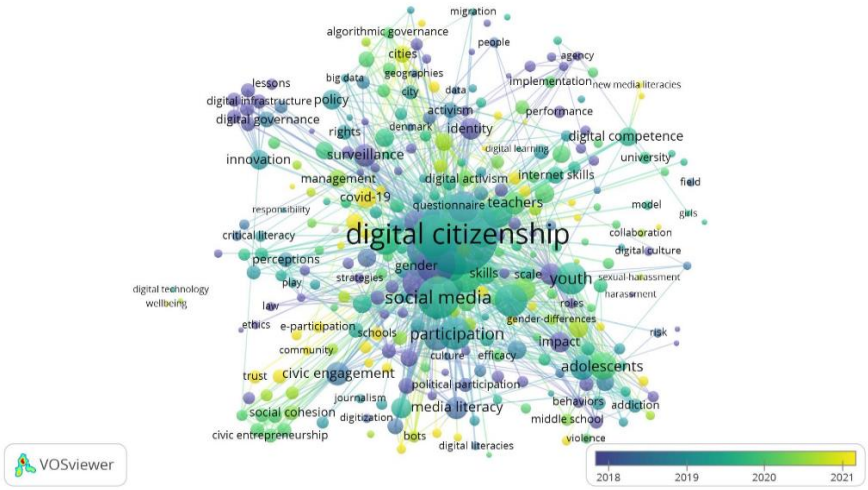


Figure 4. Temporal appearance of descriptors related to digital citizenship.
Source: Self-made from VOSviewer.
Network parameters: 3 occurrences (152 words); attraction 3; clustering 1.00; weight by total link strengths (tls).

Regarding institutional collaboration, the absence of Latin American institutions is noted, a trend that may be related to the profile of the information source used with less representation of regions, even though the emerging index was included in the present study. Five (5) clusters are observed grouping those with the highest activity in generating new knowledge on the topic, leaders within each cluster such as University of Maryland (green cluster), University of Leeds (blue cluster), Toronto (yellow cluster), and a scattered group without significant leadership (red cluster) (**Figure 5**).

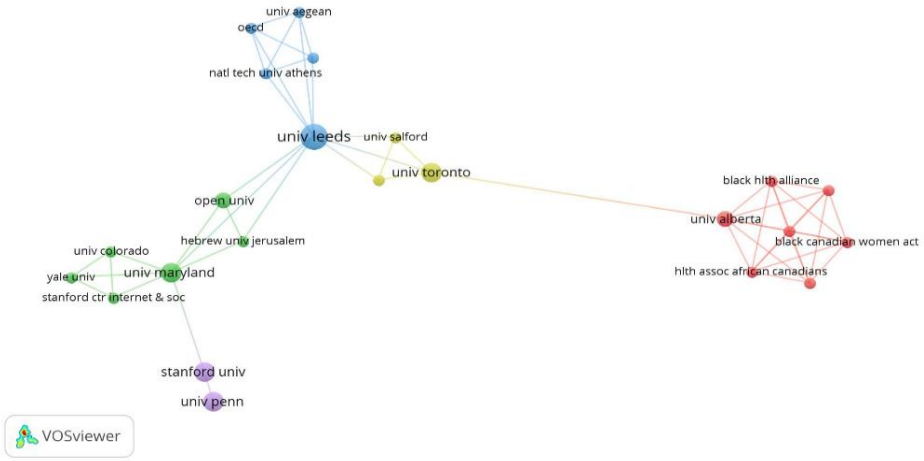


Figure 5. Institutional collaboration network.
Source: Self-made from VOSviewer.

Network parameters: minimum threshold 1 document, 1/citation 358 institutions; attraction 0; clustering 1.00; weight analysis per document.

Among the countries with the highest scientific production and collaboration on the topic of interest, the United States and England stand out, along with Spain, China, and Australia, which exhibit a considerable number of publications, a trend observed in the thickness of the flow lines on the map (**Figure 6**). Although the analysis must take into account the Anglo-Saxon bias of a source like WoS, which despite including a high number of more peripheral journals such as emerging ones, collaboration flows are between the United States and Europe, China, Australia, and to some extent, Spain with a notable absence of working relationships with Latin America whose collaboration connections are weak, a situation recommended to increase research on the topic and strengthen working relationships with countries of greater tradition.

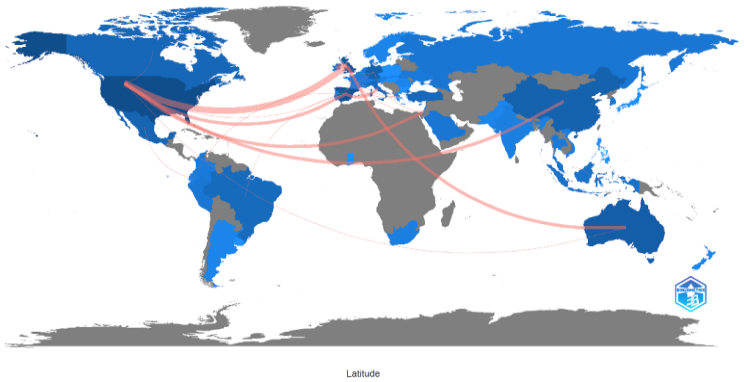


Figure 6. Country collaboration map.
Source: Map generated from biblioshiny.

To study the intellectual structure of the topic, coupling and co-citation techniques have been employed, which examine different dimensions of information while providing descriptive insights into knowledge domains (Donthu et al., 2021) and help understand influences and contributions of literature variables such as authors, documents, and journals. Specifically, in the case of coupling, it has been applied to documents and journals, while co-citation has been used for authors, enabling the

understanding and study of the intellectual foundation based on the bibliography used by the specialized scientific community.

Document coupling is important for evaluating domains as it shows the most frequently cited bibliography and serves as a tool to understand thematic research fronts. According to **Figure 7** and **Table 5**, the strength of a link in the case of bibliographic coupling indicates the number of cited references that have two publications in common. In this case, the most referenced bibliographic sources in disciplinary research are presented, which constitute foundational literature useful for consultations and the generation of new knowledge on the topic.

Table 5. Documents with the highest coupling strength.

R	Document	Citation	Total link strength (tls)*
1	Choi (2018)	34	113
2	Kim (2018)	30	99
3	Heath (2018)	10	88
4	Choi (2017)	53	79
5	Schou (2018)	12	74
6	Xu (2019a)	34	71
7	Xu (2019b)	13	69
8	Yue (2019)	10	66
9	Lozano-Diaz (2018)	12	63
10	Wangle (2018)	18	55
11	Kara (2018)	11	55

Source: Self-made from VOSviewer—Ordered by total link strength value. *R* = document position.

Similarly, the size of the nodes visualizes those references most shared in the bibliography on digital citizenship according to total link strength (tls). The total strength of links or tls is proportional to the degree of connection, where a higher tls value indicates a stronger relationship between the elements studied. Stand out Choi's 2018 publication titled "Teachers as digital citizens: The influence of individual backgrounds, internet use and psychological characteristics on teachers' levels of digital citizenship" published in the journal Computers & Education; in second place is Kim's 2018 work, "Development of youth digital citizenship scale and implication for educational setting" published in the journal Educational Technology and Society, which stand out for their network strength grouped into 11 clusters.

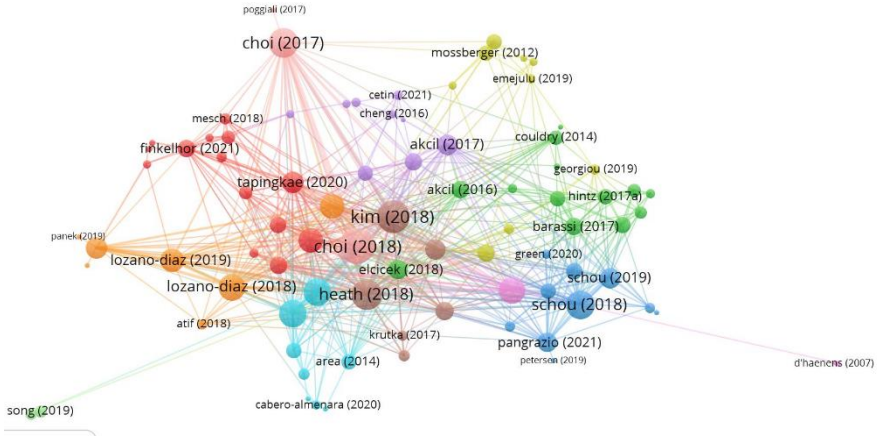


Figure 7. Bibliographic document coupling visualization map.

Source: Self-made from VOSviewer.
Network parameters: minimum 5 citations (100 documents); attraction 0; clustering 0.75; weight analysis by tls.

Journal coupling exposes the most used bibliography in scientific production, which are also important as bibliographic inputs for the generation of new knowledge, that is, determining the most used journals by those researching the topic. In this case, the technique represents the importance and relevance of a set of sources with a higher level of usage as the references in which they appear are shared. The journals were grouped into eight clusters where Educational Technology & Society, Computers & Education, Educational Research Review, Learning Media and Technology, and Citizenship Studies stand out for their relevance and strength within the network, among others (**Figure 8** and **Table 6**), which also constitute important communication channels within the field as these are intellectual bases for consultation, journals focused on the Education discipline and positioned in the top 50% of the database (top quartiles), based on their citation levels.

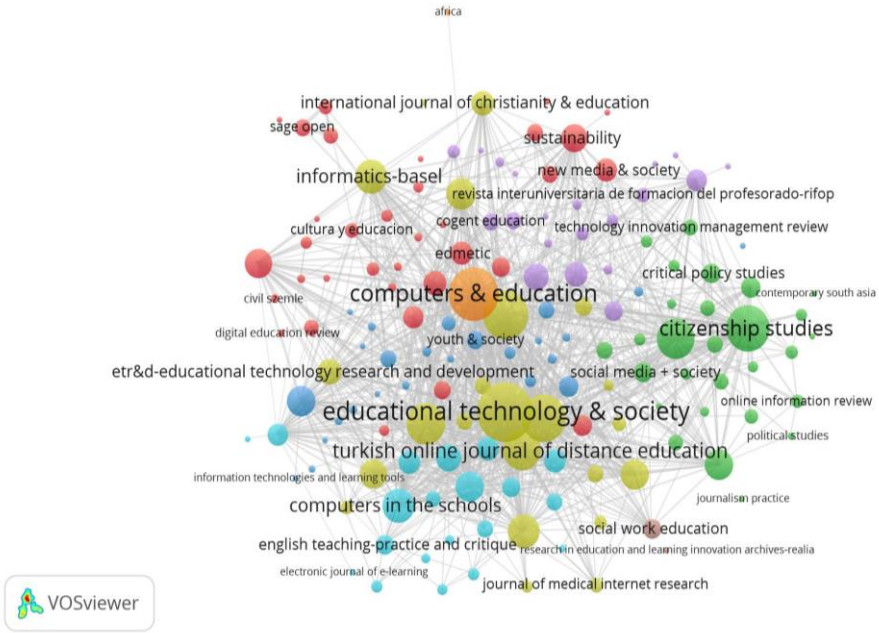


Figure 8. Journal coupling network.

Source: Self-made from VOSviewer. Network parameters: minimum 1 document and 1 citation (160 journals out of 235); attraction 1; clustering 0.75; weight by tls.

Table 6. Journals with the highest docking strength.

R	Journal	Documents	Citations	Total link strength (tls)*
1	Educational technology & society	10	181	679
2	Computers & education	4	105	557
3	Educational research review	1	3	461
4	Learning media and technology	5	207	436
5	Citizenship studies	7	60	416
6	Education in the knowledge society	3	17	335
7	International journal of communication	10	224	310
8	Turkish online journal of distance education	3	9	305
9	Informatics-basel	1	4	230
10	Computers in the schools	4	13	229

Source: Own elaboration. Note: *R* = journal position.

Through co-citation analysis, aspects of the intellectual structure are revealed, specifically the most influential authors in the discipline or topic under study and the relationships between them (Small, 1973). In this study, 4 clusters were identified, grouping the 158 authors with the highest intellectual influence within the analyzed documents. The size of the circle represents the strength of co-citation among the authors, according to the similarity measure of association strength provided by the VOSviewer program. Three prominent authors are observed: Ribble M affiliated with the Digital Citizenship Institute, Choi M from the University of New Mexico, United States, and Mossberger K from Arizona State University (**Figure 9** and **Table 7**). The significance of this technique applied to authors lies in its ability to unveil the intellectual structure by exposing the citation relationships between authors and thus defining the relevance of authors in the discipline, as evidenced in **Table 7** based on their network strength (tls).

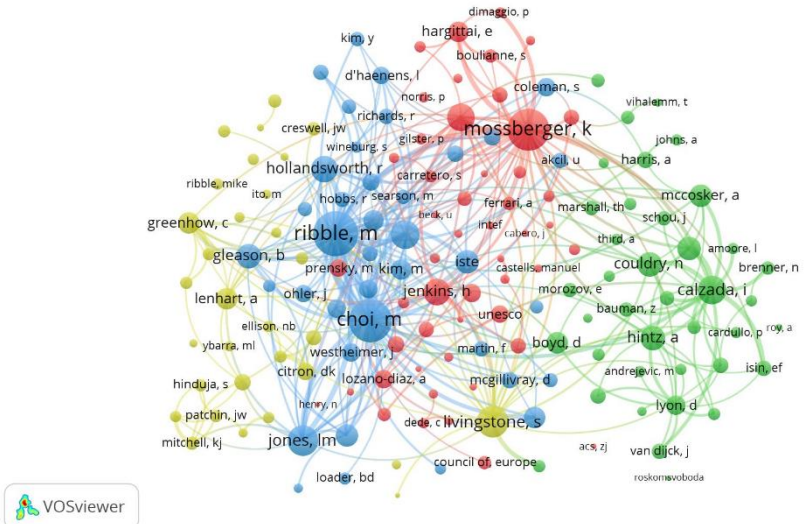


Figure 9. Network of authors with the highest co-citation strength on digital citizenship.

Source: Self-generated from VOSviewer.
Source: Self-made from VOSviewer. Network parameters: minimum 8 citations (158 authors); attraction 1; clustering 0.75; weighted by total link strength

Table 7. Most influential authors according to co-citation.

R	**Document**	**Citations**	**Total link strength (tls)***
1	Choi (2018)	34	113
2	Kim (2018)	30	99
3	Heath (2018)	10	88
4	Choi (2017)	53	79
5	Schou (2018)	12	74
6	Xu (2019a)	34	71
7	Xu (2019b)	13	69
8	Yue (2019)	10	66
9	Lozano-Díaz (2018)	12	63
10	Wangle (2018)	18	55
11	Kara (2018)	11	55

Source: Self-generated from VOSviewer—Ordered by co-citation strength. *R* = document position.

4. Discussion

The use of bibliometric methods and techniques to study scientific disciplines has provided insights into their trends, regularities, and research practices. Additionally, these enable the understanding of behavioral patterns present in the literature and the mapping of relationships across various variables (Arencibia and De Moya, 2008). Despite the ongoing debate regarding the relevance of indicators (Hicks et al., 2015), these tools facilitate the improvement of research, enhance the visibility and impact of stakeholders in the scientific system, and offer insights for the development of new investigations.

The use of indicators of production, impact, collaboration and techniques such as co-citation and bibliographic coupling, as well as co-occurrence of terms, is an important contribution to the study of the representation and analysis of knowledge domains and, specifically, to the dynamics of digital citizenship research (Arencibia-Jorge et al., 2020). These applications and results provide trends on digital citizenship, knowledge about who contributes, collaborative networks and thematic maps, but also important information about the intellectual and conceptual structure of the domain.

While WoS is a widely recognized source of information within the academic community, its biases towards regions and disciplines with less citation tradition, such as Social Sciences and Humanities, are evident. Although this may influence the results of the current article, it is not a detail that invalidates its contributions. The findings validate the essence of digital citizenship in global society and its significance in fostering competencies for active participation in social, professional, and civic life (Milenkova and Lendzhova, 2021).

Regarding research trends in digital citizenship, a notable growth in this subject is highlighted as of 2018 and to a greater extent in the last four years. This outcome

could be associated with the interest in exploring how technological environments have become involved and impacted various aspects of human life, a situation further exacerbated by the challenges posed during the Covid-19 pandemic, which necessitated increased isolation and social distancing (Gómez-Velasco et al., 2021; Ballesteros-Alfonso and Gómez-Velasco, 2022).

This annual increase in research on the topic is similar to previous studies (Palaz et al., 2022), which have highlighted the interest in the field of education, particularly in the educational and social networks (Fernández-Prados et al., 2020), despite the limited number of annual works and the consequent need for more space in specialized scientific journals (Richardson et al., 2021). The greater presence of research from countries in the global north, contrasted with the limited contributions from Latin America, is consistent with other findings indicating that the production from this geographical region is still limited but predominantly focused on the educational domain (Rendón and Angulo, 2022).

In terms of methodology, the organization of thematic map quadrants with groupings into basic, emerging, leading, and niche themes represents a valuable contribution to the research topic. The use of indicators and bibliometric techniques has helped in understanding frameworks and relevant information regarding digital citizenship, shedding light on areas that may not have been thoroughly investigated or published yet. Themes such as digital literacy, digital skills and media, citizenship and the internet, along with others like higher education, are prominently featured in the bibliometric mapping, akin to previous studies (Taskiran, 2021). These themes are interconnected with digital tools, spaces, and practices (Buchholz et al., 2020). To know the relevance of these terms related to digital citizenship research is an important contribution for those interested in the subject and the generation of new study proposals".

The examination of the intellectual foundation of the discipline using of coupling and co-citation techniques has enabled the study of the intellectual structure of digital citizenship and its research practices, as well as collaboration relationships and the use of co-words in texts, highlighting the significance of authors, journals, and relevant documents.

The results obtained through the application of these techniques provide valuable information for the research process, given their role in generating new knowledge. Moreover, since citations serve as a proxy for importance in the scientific process, the analyses and outcomes derived from the application of these techniques reveal the most cited variables in the evaluated bibliographic corpus.

Another significant finding is the link between digital citizenship and education, evident in the analysis of descriptors, although it does not explicitly exclude contributions published in other areas of knowledge. Education emerges as a central topic of interest intertwined with research conducted on digital citizenship, with a higher frequency of appearance in the keywords of documents published in WoS, especially following the declaration of the pandemic. One possible explanation for this emphasis may be linked to global concerns regarding the disruption of educational systems during times of pandemic and the subsequent need for research and reflections aiming at the transformation and utilization of technologies in teaching and learning

processes. The theme of technologies stands out as one of the most prominent during the period 2020 and 2021, as evidenced in (Gómez et al., 2021).

Among the limitations of this research is the inclusion of only one WoS database, which motivates future studies to extend the analysis to other bibliographic databases, such as Scopus and ERIC, allowing the subject to be approached from different approaches and lines of research. Another limitation lies in the fact that most of the publications analyzed are in English, which excludes relevant studies in other languages, especially those produced in Latin American contexts and regions. Finally, the temporal delimitation of the study to the year 2022 implies that more recent research was not considered, which opens the opportunity to continue exploring developments and emerging trends in recent years, particularly in areas where artificial intelligence has experienced accelerated growth.

As future lines of research, it is recommended that other studies be carried out to strengthen studies related to technologies and social networks, the strengthening of digital competencies in citizenship and aspects derived from the thematic analysis and mapping of trends. Additionally, there is a need to delve deeper into the educational sector concerning generational gaps and rural areas. These recommendations are justified by following the proposals of a significant number of authors, journals, and institutions presented and analyzed in this article, all of which contribute to the knowledge generation flows on digital citizenship. This serves as a roadmap for the development and consolidation of future research directions. For the specific case of Latin America, lines of research are suggested to investigate strategies for greater funding, new opportunities for collaboration, as well as policies that encourage research on digital environments.

Author contributions: Conceptualization, NYGV and OGC; methodology, NYGV, OGC and JKRG; software, OGC and JKRG; validation, NYGV, JKRG and OGC; formal analysis, NYGV, JKRG and OGC; investigation, NYGV, JKRG and OGC; resources, NYGV; data curation, JKRG and OGC; writing—original draft preparation, NYGV, JKRG and OGC; writing—review and editing, NYGV, JKRG and OGC; visualization, JKRG and OGC; supervision, NYGV, JKRG and OGC; project administration, NYGV, JKRG and OGC; funding acquisition, NYGV. All authors have read and agreed to the published version of the manuscript.

Funding: This research has been funded by the UNIVERSIDAD PEDAGÓGICA Y TECNOLOGICA DE COLOMBIA, under the institutional project code SGI. The APC has been funded by the UNIVERSIDAD PEDAGÓGICA Y TECNOLOGICA DE COLOMBIA, under the project code SGI 3716.

Conflict of interest: The authors declare no conflict of interest.

References

Arencibia Jorge, R., & De Moya Anegón, F. (2008). The evaluation of scientific research: a theoretical approach from scientometrics (Spanish). Acimed, 17(4), 1-27. http://scielo.sld.cu/pdf/aci/v17n4/aci04408.pdf

Arencibia-Jorge, R., Vega-Almeida, R. L., & Carrillo-Calvet, H. (2020). Evolution and multidisciplinary scope of three bibliometric analysis techniques (Spanish). Palabra Clave (La Plata), 10(1), e102. https://doi.org/10.24215/18539912e102

Aria, M., & Cuccurullo, C. (2017). Bibliometrix : An R-tool for comprehensive science mapping analysis. Journal of Informetrics, 11(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Ballesteros-Alfonso, A. L., & Gómez-Velasco, N. Y. (2022). Inequality of Saber-11 test scores before and during the covid-19 pandemic (2014-2021) (Spanish). Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud, 20(3), 1–23. https://doi.org/10.11600/rlcsnj.20.3.5189

Beghetto, R. A., & Kaufman, J. C. (2009). Intellectual Estuaries: Connecting Learning and Creativity in Programs of Advanced Academics. Journal of Advanced Academics, 20(2), 296–324. https://doi.org/10.1177/1932202x0902000205

Bibliometric Indicators. (2020). SAGE Research Methods Foundations. https://doi.org/10.4135/9781526421036825851

Boyack, K. W., & Klavans, R. (2010). Co-citation analysis, bibliographic coupling, and direct citation: Which citation approach represents the research front most accurately? Journal of the American Society for Information Science and Technology, 61(12), 2389–2404. Portico. https://doi.org/10.1002/asi.21419

Buchholz, B. A., DeHart, J., & Moorman, G. (2020). Digital Citizenship During a Global Pandemic: Moving Beyond Digital Literacy. Journal of Adolescent & Adult Literacy, 64(1), 11–17. Portico. https://doi.org/10.1002/jaal.1076

Chan, S., & Yuen, M. (2014). Personal and environmental factors affecting teachers' creativity-fostering practices in Hong Kong. Thinking Skills and Creativity, 12, 69–77. https://doi.org/10.1016/j.tsc.2014.02.003

Claro M., Santana L.M., Alfaro, A., & Franco R. (2021). Digital citizenship in Latin America: a conceptual review of initiatives (Spanish). Serie Políticas Sociales, N° 239 (LC/TS.2021/125), Santiago, Comisión Económica para América Latina y el Caribe (CEPAL). https://hdl.handle.net/11362/47356

Cobo, C. (2019). Digital citizenship and education: new citizenships for new environments (Spanish). Revista Mexicana de Bachillerato a Distancia, 11(21). https://doi.org/10.22201/cuaed.20074751e.2019.21.68214

Council of Europe. (2021). Highlights 2020: Human rights, democracy and the rule of law. Activity report. Council of Europe.

Davis, V. (2017). What Your Students Really Need to Know About Digital Citizenship: Ideas on how to guide students to the knowledge and experience they need to act responsibly online. Edutopia.

De Bellis, N. (2009). Bibliometrics and citation analysis. From the Science Citation Index to Cybermetrics. Scarecrow Press.

Ding Y., Chowdhury, G.G., & Foo, S. (2001). Bibliometric cartography of information retrieval research by using co-word analysis. Information Processing and Management, 37(6), 817-842. https://doi.org/10.1016/S0306-4573(00)00051-0

Domínguez-Delgado, R., & López-Hernández, M.-Á. (2020). Documentation at the service of R&D&I projects (Spanish). Scire: Representación y Organización Del Conocimiento, 26(1), 57–61. https://doi.org/10.54886/scire.v26i1.4690

Donthu, N., Kumar, S., Mukherjee, D., et al. (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

Fernández-Prados, J. S., Lozano-Díaz, A., & Cuenca-Piqueras, C. (2020). Digital Citizenship and Education. In:Proceedings of the 2020 8th International Conference on Information and Education Technology. https://doi.org/10.1145/3395245.3396430

Gardner, H. & Davis, K. (2013). The app generation: How today's youth navigate identity, intimacy, and imagination in a digital world. New Haven, CT: Yale University Press.

Glänzel, W. (2002). Co-authorship patterns and trends in the sciences (1980-1998): A bibliometric study with implications for database indexing and search strategies. Library Trends, 50(3), 461-473.

Glänzel, W. (2012). Bibliometric methods for detecting and analysing emerging research topics. El Profesional de La Informacion, 21(2), 194–201. https://doi.org/10.3145/epi.2012.mar.11

Hernández Escobar, A. A., Ramos Rodríguez, M. P., Placencia López, B. M., et al. (2018). Methodology of scientific research (Spanish). Editorial Científica 3Ciencias. https://doi.org/10.17993/ccyll.2018.15

Hicks, D., Wouters, P., Waltman, L., et al. (2015). Bibliometrics: The Leiden Manifesto for research metrics. Nature, 520(7548), 429–431. https://doi.org/10.1038/520429a

Hui, A. N. N., & Lau, S. (2010). Formulation of Policy and Strategy in Developing Creativity Education in Four Asian Chinese Societies: A Policy Analysis. The Journal of Creative Behavior, 44(4), 215–235. Portico. https://doi.org/10.1002/j.2162-6057.2010.tb01334.x

James, C., Weinstein, E., & Mendoza, K. (2021). Teaching digital citizens in today's world: Research and insights behind the Common Sense K-12 Digital Citizenship Curriculum. San Francisco, CA: Common Sense Media.

Jarneving, B. (2005). A comparison of two bibliometric methods for mapping of the research front. Scientometrics, 65(2), 245–263. https://doi.org/10.1007/s11192-005-0270-7

Kessler, M. M. (1963). Bibliographic coupling between scientific papers. American Documentation, 14(1), 10–25. Portico. https://doi.org/10.1002/asi.5090140103

Kozbelt, A., Beghetto, R. A., & Runco, M. A. (2010). Theories of Creativity. The Cambridge Handbook of Creativity, 20–47. https://doi.org/10.1017/cbo9780511763205.004

Lenhart, A. (2015). Teens, technology and friendships. Pew Research Center.

Levin, R.I., & Rubin, D.S. (2004). Statistics for management and economics (Spanish). Pearson educación.

Ley. (2019). National Development Plan. Available online: https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=93970 (accessed on 2 June 2024).

Marshakova-Shaikevich, I. (1973). A system of document connection based on references. Nauchno-Tekhnicheskaya Informatsiya, 6(2), 3-8.

McCain, K.W. (1991). Mapping economics through the journal literature: An experiment in journal cocitation analysis. Journal of the American Society for Information Science, 42(4), 290-296. https://doi.org/10.1002/(SICI)1097-4571(199105)42:43.0.CO;2-9

Milenkova, V., & Lendzhova, V. (2021). Digital Citizenship and Digital Literacy in the Conditions of Social Crisis. Computers, 10(4), 40. https://doi.org/10.3390/computers10040040

Moed, H.F. (2000). Bibliometric indicators reflect publication and management strategies. Scientometrics, 47, 323-346. https://doi.org/10.1023/A:1005695111622

Mossberger, K., Tolbert, C. J., & McNeal, R. S. (2007). Digital Citizenship. https://doi.org/10.7551/mitpress/7428.001.0001

Olivera Batista, D., Peralta González, M. J., & García García, O. (2018). Co-authorship as an expression of collaboration in Camagüey's scientific production (Spanish). Biblios Journal of Librarianship and Information Science, 70, 1–16. https://doi.org/10.5195/biblios.2018.423

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura. (2018). Digital skills are essential for employment and social inclusion (Spanish). Available online: https://es.scribd.com/document/522034902/Las-Competencias-Digitales-Son-Esenciales-Para-El-Empleo-y-La-Inclusion-Social (accessed on 2 June 2024).

Örtegren, A. (2022). Digital Citizenship and Professional Digital Competence — Swedish Subject Teacher Education in a Postdigital Era. Postdigital Science and Education, 4(2), 467–493. https://doi.org/10.1007/s42438-022-00291-7

Palaz, T., Kilcan, B., & Çepni, O. (2022). Science Mapping Research on Digital Citizenship Research in Education. Participatory Educational Research, 9(6), 248–267. https://doi.org/10.17275/per.22.138.9.6

Pathak-Shelat, M., & Bhatia, K. V. (2018). Young people as global citizens: negotiation of youth civic participation in adult-managed online spaces. Journal of Youth Studies, 22(1), 87–107. https://doi.org/10.1080/13676261.2018.1483074

Perkins, D.N., & Tishman, S. (2006). Learning that matters: Toward a Dispositional Perspective on Education and its Research Needs'. Harvard Graduate School of Education.

Petersen, A., Schermuly, A. C., & Anderson, A. (2018). The shifting politics of patient activism: From bio-sociality to bio-digital citizenship. Health: An Interdisciplinary Journal for the Social Study of Health, Illness and Medicine, 23(4), 478–494. https://doi.org/10.1177/1363459318815944

Rendón Gil, J. G. R., & Angulo Armenta, J. (2022). Meta-analysis on digital citizenship in Iberoamerica: emphasis on education (Spanish). Edutec Revista Electrónica de Tecnología Educativa, 82, 91–103. https://doi.org/10.21556/edutec.2022.82.2593

Rendueles Menéndez de Llano, C. (2016). Digital citizenship - augmented agora or post-materialistic individualism / Digital Citizenship (Spanish). Increased agora or postmaterialism individualism? Revista Latinoamericana de Tecnología Educativa - RELATEC, 15(2), 15–24. https://doi.org/10.17398/1695-288x.15.2.15

Revistas. (n.d.). Journal Historia de la Educación Latinoamericana (Spanish). Available online: https://revistas.uptc.edu.co/index.php/historia_educacion_latinamerican/index (accessed on 2 June 2024).

Ribble, M. & Park, M. (2019). The Digital Citizenship Handbook for School Leaders: Fostering Positive Interactions Online. Portland, International Society for Technology in Education.

Ribble, M., & Bailey, B. (2015). Digital Citizenship in Schools: Nine Elements All Students Should Know, 3rd ed. International Society for Technology in Education.

Richardson, J. W., Martin, F., & Sauers, N. (2021). Systematic review of 15 years of research on digital citizenship: 2004–2019. Learning, Media and Technology, 46(4), 498–514. https://doi.org/10.1080/17439884.2021.1941098

Rodríguez Gutiérrez, J. K., Gómez Velasco, N. Y., & Herrera-Martínez, Y. (2017). Bibliometric techniques in scientific production dynamics in research groups (Spanish). Caso de estudio: Biología- UPTC. Revista Lasallista de Investigación, 14(2), 73–82. https://doi.org/10.22507/rli.v14n2a7

Romaní, F., Huamaní. C & González-Alcaide, G. (2011). Bibliometric studies as a line of research in the biomedical sciences: an undergraduate approach (Spanish). Ciencia e Investigación Médica Estudiantil Latinoamericana, 16(1), 52-62. https://www.redalyc.org/pdf/717/71723602008.pdf

Romero-Pérez, I. & Pulido-Rojano, A. (2018). Applications of the co-word analysis method (co-word analysis) (Spanish). Corporación Universitaria Reformada.

Sanabria Mesa, A. L., & Cepeda Romero, O. (2016). La educación para la competencia digital en los centros escolares: la ciudadanía digital / Education for digital competence in schools: digital citizenship (Spanish). Revista Latinoamericana de Tecnología Educativa - RELATEC, 15(2), 95–112. https://doi.org/10.17398/1695-288x.15.2.95

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. Journal of the American Society for Information Science, 24(4), 265–269. Portico. https://doi.org/10.1002/asi.4630240406

Taskiran, C. (2021). Bibliometric Analysis of Researches on Digital Citizenship in Web of Science Database. International Online Journal of Educational Sciences, 13(2). https://doi.org/10.15345/iojes.2021.02.015

Van Bavel, R., Punie, Y., & Tuami, I. (2004). Changes in social capital, possibilities through ICTs (Spanish). IPTS Report, 85 (4).

van Eck, N. J., & Waltman, L. (2009). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Vera-Baceta, M.-Ã., & GÃ³mez-HernÃ¡ndez, J.-A. (2021). â€œDigital citizenship spacesâ€ in public libraries: a proposal for their integration in the framework of the National Digital Skills Plan (Spanish). Anuario ThinkEPI. p. 15. https://doi.org/10.3145/thinkepi.2021.e15b02

Villar-Onrubia, D., Morini, L., Marín, V. I., et al. (2022). Critical digital literacy as a key for (post)digital citizenship: an international review of teacher competence frameworks. Journal of e-Learning and Knowledge Society, Vol 18 No 3 (2022): Journal of e-Learning and Knowledge Society. https://doi.org/10.20368/1971-8829/1135697

Wang, X., & W. Xing. (2018). Exploring the Influence of Parental Involvement and Socioeconomic Status on Teen Digital Citizenship: A Path Modeling Approach. Educational Technology and Society, 21(1), 186-199.

Weinstein, E., & James, C. (2022). School-Based Initiatives Promoting Digital Citizenship and Healthy Digital Media Use. Handbook of Adolescent Digital Media Use and Mental Health, 365–388. https://doi.org/10.1017/9781108976237.020

White, H. D., & Griffith, B. C. (1981). Author cocitation: A literature measure of intellectual structure. Journal of the American Society for Information Science, 32(3), 163–171. Portico. https://doi.org/10.1002/asi.4630320302

Yue, A., & Beta, A. R. (2022). Digital citizenship in Asia: A critical introduction. International Communication Gazette, 84(4), 279–286. https://doi.org/10.1177/17480485221094100