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Trends and trajectories in MOOCs research terrain: a bibliometric mapping from 2008 to 2023

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ABSTRACT

Massive open online courses (MOOCs) have gained rising popularity as a transformative approach to making education accessible to a global audience. This bibliometric review aims to map the evolving landscape of MOOCs research from 2008 to 2023, analyzing 2,026 Scopus-indexed articles using VOSviewer 1.6.20. The findings highlight a publication surge, particularly after 2013, driven by technological advancements and the global shift toward accessible education. China and the US were found to lead in publication volume, and journals such as 'the International Review of Research in Open and Distance Learning (IRRODL)' and 'computers and education' stand out for their publications and influence. Further, the co-authorship analysis reveals a core group of 17 prominent authors; however, many authors remain unconnected, indicating potential for future collaboration. Meanwhile, the co-citation analysis highlights influential works emphasizing instructional quality and self-regulated learning in MOOCs. Additionally, keyword occurrence marks emerging research themes, including 'e-learning,' 'distance learning,' 'self-regulated learning,' and the integration of 'AI and learning analytics,' demonstrating the field's technological evolution within MOOCs. These findings suggest that MOOCs, enriched with advanced technologies, can enhance educational accessibility, particularly in underserved regions, contributing to sustainable development goal 4 (SDG 4).

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1. INTRODUCTION

Over the past decade, the rapid advancement of digital technology has significantly transformed the delivery of instruction [1], especially in the domain of online learning [2]. This evolution has revolutionized traditional educational practices, providing a more accessible and dynamic learning environment [1]. Unlike its traditional counterpart, online learning removes constraints related to time and space, providing flexibility for educators and learners. Within the realm of online learning, massive open online courses (MOOCs) have surfaced as a potential development, epitomizing the latest evolution of distance education [3].

Since its inception in 2008, notably marked by the course "connectivism and connective knowledge" led by Stephen Downes and George Siemens at the University of Manitoba [4], MOOCs have captivated the attention of diverse stakeholders, including educators, researchers, policymakers, and learners worldwide. However, despite its inception, MOOCs did not gain significant attention until 2011, when Stanford University offered the course "introduction to artificial intelligence (AI)," taught by Sebastian Thrun and Peter Norvig, which is discussed in [5]. This course marked the emergence of

MOOCs as a successful educational model by attracting over 160,000 participants globally [6], signifying a pivotal moment in online learning via a learning management system.

The acronym "MOOC" consists of its defining characteristics: "massive," "open," and "online." The term "*massive*" signifies the absence of enrollment limitations, allowing unrestricted participation. "*Open*" denotes freedom from time and financial constraints, geographical restrictions, or admission standards, ensuring inclusivity and accessibility for all learners. Lastly, "*online*" indicates that the learning mode occurs via the internet, facilitating flexible and remote access to educational content and resources. Together, these elements signify the democratizing potential of MOOCs, empowering learners worldwide to engage in lifelong learning regardless of traditional barriers [7]. Moreover, this venture has laid the groundwork for a new era in online education, marked by openness, scalability, and collaboration [8]. Subsequently, online MOOC platforms like Coursera, Udemy, Udacity, SWAYAM, and edX emerged [9], attracting millions of learners worldwide with their diverse course offerings from prestigious institutions. This exponential growth of MOOCs and MOOC platforms [10], coupled with advancements in digital technology and pedagogy, has led to a growing landscape of research aimed at understanding various facets of MOOCs, ranging from their effectiveness in facilitating learning to their impact on educational equity and associated challenges [11]–[14].

The emergence of MOOCs [15] has sparked significant scholarly interest, leading to a growing body of literature exploring various facets of this innovative educational domain. Further, examining MOOCs has gained substantial research attention through systematic literature reviews (SLRs) and bibliometric analyses, yet several gaps that necessitate a more comprehensive study remain. For instance, Raffaghelli *et al.* [16] conducted an SLR covering 60 journal articles from 2008 to 2014, providing initial insights into MOOC research but limited by its narrow scope and timeframe. Bozkurt *et al.* [17] significantly expanded the scope by reviewing 362 journal articles from multiple databases up to 2015, offering a broader perspective but still confined to a limited time frame. Deng and Benckendorff [18] took a more inclusive approach by analyzing 53 documents, including journal articles, conference papers, book chapters, and unpublished theses and dissertations from 2014 to 2016, yet their dataset remained relatively small.

Similarly, Zheng and Yang [19] focused on the Chinese MOOCs' academic perspective by conducting a bibliometric analysis of 445 journal articles from the China academic journal network publishing database (CAJD) between 2013 and 2016, highlighting regional contributions but limiting a global scope. Following this, Zhu *et al.* [20] reviewed 146 journal articles published between 2014 and 2016, sourced from key journals indexed in Scopus and other non-indexed journals, offering selective insights but not covering the full spectrum of MOOC research. Building on these efforts, Ramneet *et al.* [21] performed an extensive bibliometric analysis of 1511 journal articles from Scopus from 2012 to 2020, providing a comprehensive dataset limited to a single database and recent timeframe. Furthermore, Liu *et al.* [22] conducted a bibliometric analysis of 1079 journal articles from Scopus, Web of Science (WoS), and ERIC between 2008 and 2019, offering robust insights into MOOC research development but missing recent trends beyond 2019. Subsequently, Tlili *et al.* [23] focused on a single year (2020) and analyzed 108 journal articles from WoS, providing a recent snapshot but lacking the longitudinal perspective necessary for understanding long-term trends. Most recently, Wang *et al.* [24] conducted a bibliometric analysis of factors contributing to dropping out from MOOCs, offering valuable insights but with a limited scope that does not cover the broader aspect of MOOC research.

In summary, though offering valuable outputs, these studies reveal several gaps, including limited time frames, narrow datasets, and restricted database scopes. Moreover, although numerous MOOC research review studies exist, it is evident that the predominant approach has been SLR [25] rather than bibliometric ones. Therefore, a comprehensive bibliometric analysis of 2026 journal articles indexed in the Scopus database on MOOC research from 2008 to 2023 is proposed to address these gaps. This broader analysis will provide a more comprehensive understanding of development trends, collaboration patterns, prolific countries and journals, and their implications. Additionally, this study aims to guide future research directions and catalyze informed discussions and initiatives to optimize the transformative potential of online learning for better accessible and quality education. Through techniques such as citation analysis, co-authorship analysis, keyword co-occurrence analysis, and co-citation analysis, the research aims to address the following key research questions:

- Significant advances in the field of MOOC research: i) RQ1. What are the key publication trends in MOOC research from 2009 to 2023? ii) RQ2. Which are the top 10 countries contributing to MOOC research? and iii) RQ3. What are the top 10 leading journals publishing MOOC research?
- Co-authorship analysis of authors: RQ4. How do collaborative networks among authors in MOOC research manifest over time?
- Citation analysis of top 10 sources: RQ5. What are the top 10 highly cited publications in MOOC

research?
- Keyword co-occurrence analysis: RQ6. What are MOOC research's predominant emerging themes based on keyword co-occurrence analysis?
- Co-citation analysis: RQ7. What are the highly co-cited references from co-citation networks in MOOC research?

2. METHOD

The Scopus database, recognized for its extensive multidisciplinary coverage, was searched on March 20, 2024, using predetermined inclusion and exclusion criteria outlined in Table 1. Further, the study utilized the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework (Figure 1) for ensuring the systematic collection of required data sets and followed Donthu *et al.* [26] bibliometric analyses guidelines. The search syntax included the terms "massive open online course" followed by the abbreviations "MOOCs" and "MOOC," connected by the logical operator OR to ensure comprehensive article retrieval. Following the initial search, applying inclusion criteria, and the researcher's manual screening of titles and abstracts, 2026 relevant journal articles within the MOOC research domain were identified as the final dataset. This data set was downloaded in CSV Excel format from the Scopus database and exported into VOSviewer 1.6.20 version, a freely available software tool for constructing and visualizing bibliometric networks [27]. The VOSviewer output will display nodes representing authors, countries, and keywords, with the thickness of the nodes and lines indicating the strength of the items and their relationships, while colors differentiate the networks and clusters [28]. The initial publication's analysis over the years, countries, and journals was then subsequentially followed by a bibliometric analysis of co-authorship, citation, and keyword co-occurrence.

Table 1. Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Publication year	Articles published from January 2008 to December 2023	Articles published before 2008 and after 2023.
Document type	Article	Conference papers, reviews, book chapters, editorials.
Source type	Journal	Conference proceedings, books, book series, trade journals, and undefined.
Language	English	Other languages (Italian, Spanish, …)

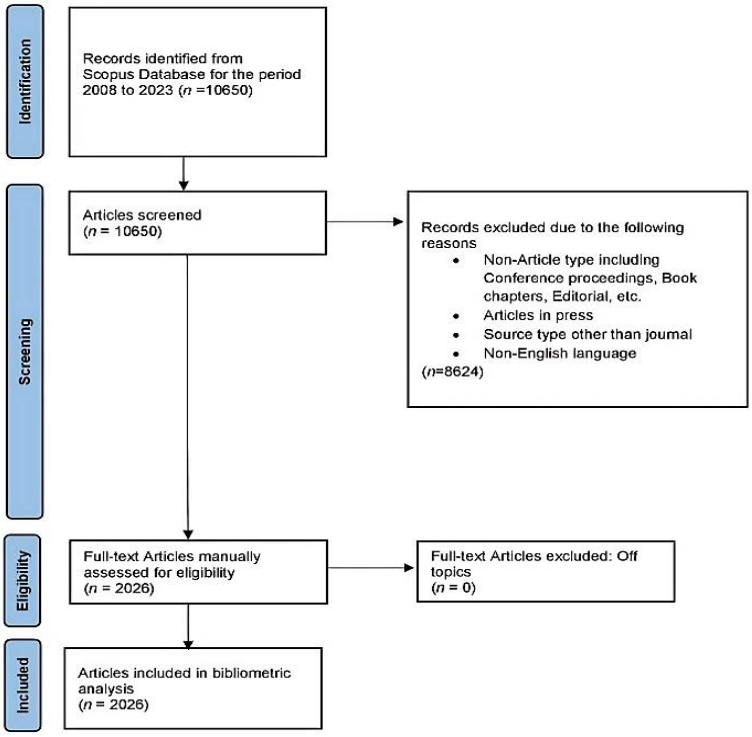

Figure 1. Data collection flow diagram (PRISMA)

3. RESULTS AND DISCUSSION

3.1. Significant advances in the field of MOOC research

3.1.1. The publication trends in MOOC research from 2008 to 2023

As shown in Figure 2 in MOOC research publications from 2008 to 2023, the upward trend indicates a growing academic and practical interest in online distance education [29]. The sharp increase from 2013 onward coincides with the mainstreaming of MOOCs, reflecting their rising acceptance and integration into educational frameworks similar to the study [22]. Further, the evident peak in 2022, with 312 publications, closely followed by 305 publications in 2021, underscores the field's dynamic and evolving nature.

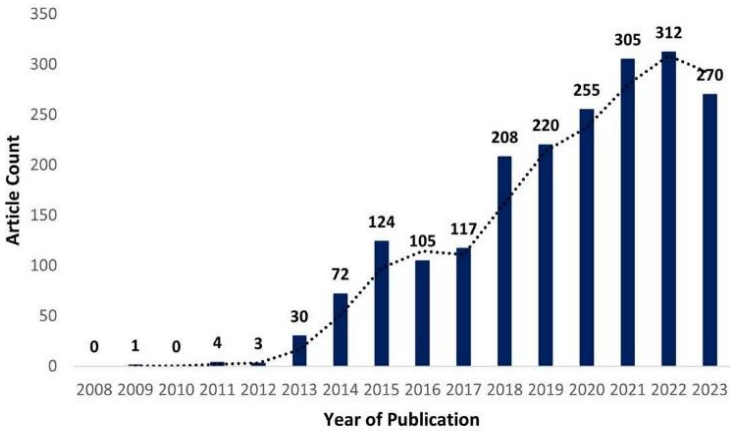

Figure 2. Annual publication

3.1.2. The top 10 countries contributing to MOOC research

The analysis of the top 10 countries in MOOC research (Figure 3) highlights significant regional contributions and the varying impact of these contributions. China and the US emerged as leading players, with China's high publication volume followed closely by the US showcasing their commitment to advancing MOOC research, as discussed by Ayoub *et al.* [30] and Zheng *et al.* [31]. However, the US surpasses China in citation counts, suggesting that American research in this domain is highly influential and often serves as a foundation for subsequent studies [32]. The UK's strong presence further emphasizes its active role in the global MOOC research landscape [33].

Other countries like Spain, Australia, and Malaysia also make significant contributions, reflecting their growing interest in and adoption of online education technologies. Despite their smaller volume of publications, including these countries in the top 10 indicates a broadening global participation in MOOC research. Additionally, while demonstrating comparatively lower involvement, countries such as India, the Netherlands, Germany, and France still play crucial roles in the field. Their contributions add to the diversity of perspectives and innovations in MOOC research, enriching the overall discourse.

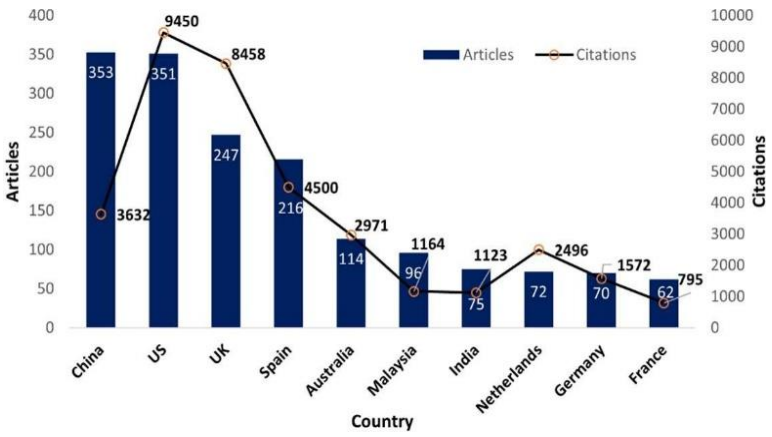

Figure 3. Leading countries in publication

3.1.3. The top 10 leading journals publishing MOOC research

The analysis of the top 10 journals in Table 2 in MOOC research reveals a diverse landscape regarding publication output and citation impact through metrics such as the number of articles, total citations, and citations per article. The International Review of Research in Open and Distance Learning (IRRODL), a prominent, peer-reviewed, open-access e-journal, stands out as the leading journal, with 129 articles and impressive citations per article count of 57.81. Its influence is further highlighted by a CiteScore of 5.6, a scimago journal rank (SJR) of 0.787, a journal impact factor (JIF) of 3.4, and an h-index of 83 [34]. Other journals also contribute significantly to the field: the *International Journal of Emerging Technologies in Learning and Sustainability (Switzerland)* published 106 and 70 articles, respectively, with lower citation counts per article at 9.65 and 12. Despite fewer articles (56), *IEEE Access* demonstrates a higher citation impact with 17.12 citations per article, reflecting the quality of its research. Additionally, *Computers & Education* holds the highest citations per article at 113.5, despite having published only 30 articles. Other journals like the *Australasian Journal of Educational Technology*, *Frontiers in Psychology*, and the *Turkish Online Journal of Distance Education* offer diverse insights into MOOC research in terms of technological advancements, psychological aspects, and educational strategies.

Table 2. Leading journals in publication

Rank	Journal (ISSN)	Articles	Citations	Citation per article
1	International Review of Research in Open and Distance Learning (1492-3831)	129	7458	57.81
2	International Journal of Emerging Technologies in Learning (1868-8799)	106	1023	9.65
3	Sustainability (Switzerland) (2071-1050)	70	841	12
4	IEEE Access (2169-3536)	56	959	17.12
5	Education Sciences (2227-7102)	39	502	12.87
6	Online Learning Journal (2472-5730)	34	526	15.47
7	Frontiers in Psychology (1664-1078)	33	208	6.3
8	Australasian Journal of Educational Technology (1449-3098)	31	744	24
9	Computers & Education (0360-1315)	30	3405	113.5
10	Turkish Online Journal of Distance Education (1302-6488)	29	288	9.93

3.2. Co-authorship analysis of authors

3.2.1. The collaborative networks among authors in MOOC research manifest over time

The network visualization of co-authorship presented in Figures 4 and 5 provides valuable insights into the collaborations within the MOOC research community. Figure 4 highlights authors with a minimum of 5 publications and 25 citations and identifies 68 prominent authors out of 5913 within the specified timeframe from 2008 to 2023. This selective threshold ensures that only highly active and impactful contributors are included in the analysis, showcasing the core group driving MOOC research. Despite many authors being unconnected, Figure 5 reveals a well-established network of 17 authors, indicating significant collaboration among these key contributors. This dense network suggests that these authors frequently co-author papers, share knowledge, and build on each other's work, leading to more robust and comprehensive research outcomes. Such collaboration is crucial in addressing MOOC research's multifaceted challenges and opportunities, as it allows for diverse expertise and perspectives pooling.

Among the identified authors, notable co-authors include *Carlos Alario-Hoyos* (author ID: 35179059300) from the Department of Telematic Engineering at Universidad Carlos III de Madrid, Leganés, Spain. He has contributed 16 documents with 674 citations and exhibits a total link strength of 38 within the co-authorship network. Similarly, *Pedro Manuel Moreno-Marcos* (author ID: 57201465612), also from the same department, has authored 11 documents with 359 citations and shows a total link strength of 35. These authors serve as significant nodes within the network, highlighting their active participation and influence in collaborative research efforts in the field of MOOC research.

3.3. Citation analysis of top 10 sources

3.3.1. The top 10 highly cited publications in MOOC research

The top-cited publications in MOOC research, as presented in Table 3, provide a comprehensive overview of influential studies within the field. These publications encompass a variety of topics, such as enrollment trends, self-regulated learning strategies, instructional quality, and retention factors, reflecting the multifaceted nature of MOOC research.

Among the top-cited works, Liyanagunawardena *et al.*'s [35] systematic study of literature from 2008-2012 stands out with the highest number of citations, 781, and published in IRRODL, highlights its

role in mapping the early developments and trends in MOOC research. Jordan [36], also published in IRRODL, with 615 citations holding the second top position in the list, examined initial trends in enrollment and completion rates, offering foundational data on how learners engage with MOOCs, which is essential for understanding and improving course design and delivery. Further, Kizilcec *et al.* [37], Margaryan *et al.* [38], and Wong *et al.* [39] emphasize the importance of self-regulated learning strategies and instructional quality in MOOC design, guiding educators on effective course delivery with 564, 504, and 293 citations, respectively. Hone and El Said [40], Littlejohn *et al.* [41], and Jordan [42] explore the retention factors, learner motivations, and completion rates crucial for improving learner engagement and success, with citations of 471, 388, and 288. Similarly, the research by Kop *et al.* [43], appearing twice on the list, delves into the challenges and support mechanisms of learning environments, adding depth to understanding learner experiences in MOOCs with 423 and 300 citations.

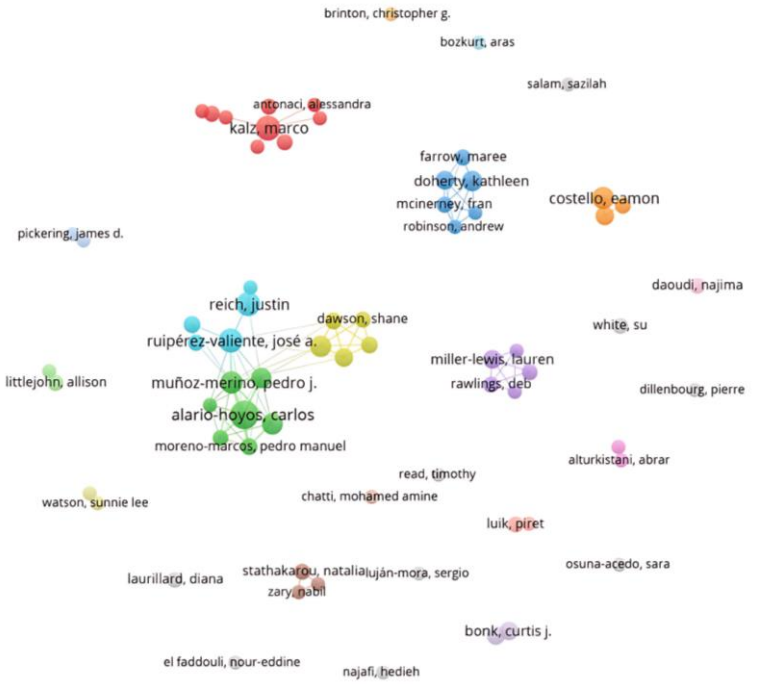

Figure 4. Network of co-authorship

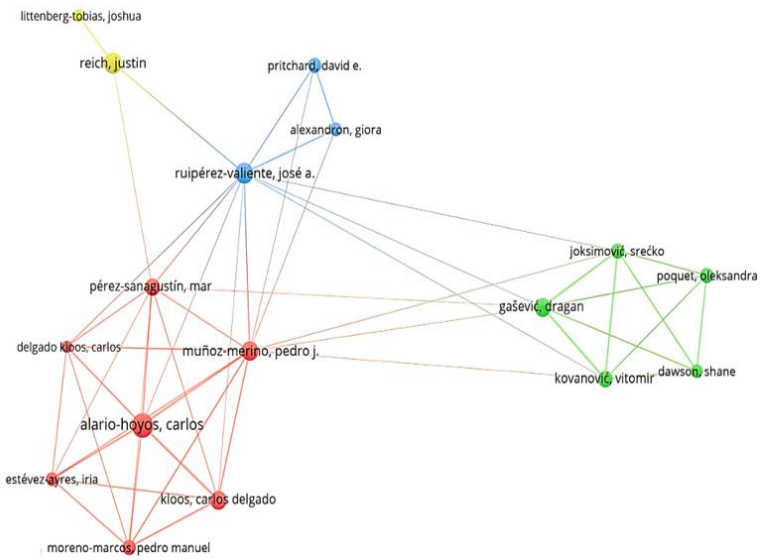

Figure 5. Largest network of co-authorship

Table 3. Top cited publications

Authors	Title	Journal	Citations
Liyanagunawardena *et al.* [35]	MOOCs: a systematic study of the published literature 2008-2012	IRRODL	781
Jordan [36]	Initial trends in enrolment and completion of massive open online courses	IRRODL	615
Kizilcec *et al.* [37]	Self-regulated learning strategies predict learner behaviour and goal attainment in massive open online courses	Computers & Education	564
Margaryan *et al.* [38]	Instructional quality of massive open online courses (MOOCs)	Computers & Education	504
Hone and El Said [40]	Exploring the factors affecting MOOC retention: a survey study	Computers & Education	471
Kop [44]	The challenges to connectivist learning on open online networks: learning experiences during a massive available online course	IRRODL	423
Littlejohn *et al.* [41]	Learning in MOOCs: motivations and self-regulated learning in MOOCs	Internet and Higher Education	388
Kop *et al.* [43]	A pedagogy of abundance or a pedagogy to support human beings? Participant support on massive open online courses	IRRODL	300
Wong *et al.* [39]	Supporting self-regulated learning in online learning environments and MOOCs: a systematic review	International Journal of Human-Computer Interaction	293
Jordan [42]	Massive open online course completion rates revisited: assessment, length, and attrition	IRRODL	288

3.4. Keyword co-occurrence analysis

3.4.1. The MOOC research's emerging themes based on author keyword co-occurrence analysis

Figure 6 displays the network visualization network of the author's keywords with a minimum threshold of 25 occurrences, resulting in 21 out of 4845 total. These keywords form three distinct clusters, represented by green, red, and blue. The network visualization underscores the central role of the critical term 'MOOCs' within the research landscape, occurring 383 times and forming the highest links (20) with other vital terms across clusters. Notably, in the blue cluster, terms such as 'e-learning' and 'distance learning' demonstrate a strong thematic association with MOOCs, reflecting their interconnectedness within the broader educational domain. E-learning' signifies the broader spectrum of electronically mediated learning experiences, encompassing diverse educational modalities delivered via digital platforms [45]. Similarly, 'distance learning' emphasizes education delivered remotely, often through online means, which aligns closely with the decentralized and accessible nature of MOOCs [46].

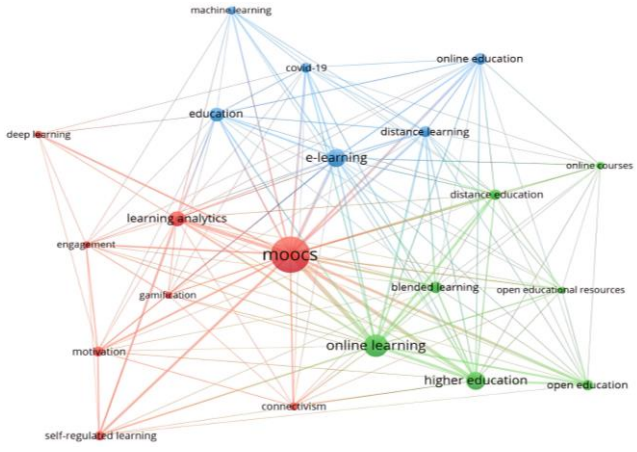

Figure 6. Network of author keywords co-occurrences

In the green cluster, terms like 'online learning,' 'higher education,' and 'open educational resources' indicate the multidimensional nature of MOOC research, encompassing diverse aspects of educational practice and resource availability. These keywords collectively highlight the expansive scope of MOOCs within educational practice and resource availability.

Within the red cluster, the presence of terms such as 'self-regulated learning,' 'learning analytics,' 'deep learning,' 'connective,' and 'gamification' underscores a strong focus on learner-centered approaches and data-driven methodologies in MOOC research. Furthermore, the red cluster's connections to terms such as 'machine learning' and 'deep learning' highlight the growing integration of AI technologies in MOOC research [47]. These advanced AI techniques enable more sophisticated and adaptive learning environments by providing personalized recommendations, predicting learner outcomes, and automating administrative tasks. The inclusion of AI signifies an evolving landscape where MOOCs are not just platforms for content delivery but dynamic, intelligent systems that continuously adapt to the needs and behaviors of learners [48].

3.5. Co-citation analysis

3.5.1. Highly co-cited references from co-citation networks in MOOC research

Figure 7 displays the co-citation network visualization of references in MOOC research, with a minimum threshold of 25 citations, identifying 14 references out of 75996. This network illustrates connections between frequently cited references in scholarly publications. Notably, the reference "Margaryan *et al.* [38], "Instructional quality of MOOCs," Computers & Education, vol. 80, 77-83" appeared as the most co-cited reference, with a total link strength of 62 and 65 citations. This is followed by reference "Littlejohn *et al.* [41], "Learning in MOOCs: motivations and self-regulated learning in MOOCs," The Internet and Higher Education, vol. 29, 40-48" with total link strengths of 60 and 44 citations, respectively. These findings substantiate the significance of these references in guiding scholarly discourse and contributing to the theoretical foundation of MOOC research across different facets.

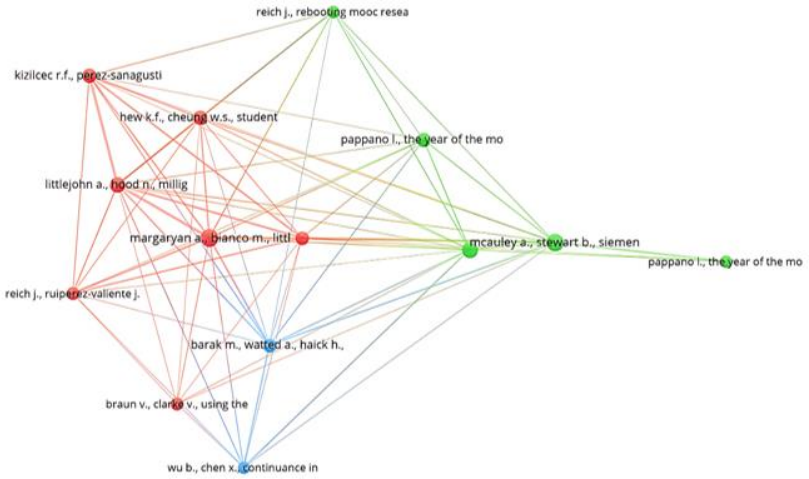

Figure 7. Network of reference co-citation

3.6. Discussion

This bibliometric review aims to map the evolving landscape of MOOCs research from 2008 to 2023 by analyzing 2,026 Scopus-indexed articles using VOSviewer 1.6.20. The analysis incorporates techniques such as citation analysis, co-authorship analysis, keyword co-occurrence analysis, and co-citation analysis. Scopus was selected for its comprehensive coverage of high-quality, peer-reviewed academic literature, making it a reliable source for tracking global research trends and ensuring the inclusion of influential studies across diverse fields [49].

The publication trend shows sustained interest and consistent growth in MOOC research demonstrating its critical role in shaping the future of education. The peak surge in publications in 2021 and 2022 is likely driven by various factors, including technological advancements, increasing demand for flexible learning options, and the global push for accessible education [50], [51]. Additionally, the COVID-19 pandemic has accelerated this trend as institutions worldwide sought online solutions for uninterrupted education [52], [53]. In short, the sustained interest and consistent growth in MOOC research demonstrate its critical role in shaping the future of education, providing insights into best practices, challenges, and innovations within online learning. Further, the country-wise contributions reveal a diverse global interest in MOOC research, encouraging international collaboration and exchanging ideas [30]. This global engagement is essential for addressing regional educational

challenges and leveraging shared knowledge to enhance the effectiveness and accessibility of MOOCs worldwide [54]. Meanwhile, the varied publication and citation impact levels among these countries also highlight the importance of quality and influence over volume, driving the field forward through impactful and widely recognized research. In leading journals of MOOC research, the prominence of journals such as IRRODL, as discussed by Liu *et al.* [22], emphasizes their critical role in disseminating high-quality research and best practices in open and distributed learning globally. Journals like Computers & Education [18], despite fewer articles, stand out for their highly impactful publications, while other journals also offer balanced and significant contributions. This varied journal landscape fosters a multi-faceted understanding of MOOCs, promoting robust academic discourse and innovation in online learning. Furthermore, the detailed metrics provide valuable insights for researchers, guiding them to select impactful journals for their MOOC-related publications and enhancing the visibility and influence of their work.

The presence of a substantial number of unconnected authors in co-authorship analysis offers the potential for further collaboration and integration within the community, as highlighted by Ramneet *et al.* [21]. Encouraging connections between isolated researchers and established networks could enhance the overall productivity and innovation in the field. Additionally, identifying these collaborative networks can help new researchers identify influential collaborators and potential mentors, facilitating their entry and growth in the MOOC research arena. The network visualizations also underscore the importance of collaboration in advancing MOOC research, as put forward by Bozkurt *et al.* [17] and Tlili *et al.* [23]. The active knowledge exchange within the well-established network of authors can contribute significantly to the MOOCs field's development, driving forward impactful research and fostering a vibrant academic community dedicated to improving online education.

In the citation analysis of the top MOOC research publications, the appearance of five highly cited studies in IRRODL further reinforces the journal's significant role in the field. These highly influential publications highlight key areas of interest and progress in MOOC research and serve as essential references for future studies aiming to enhance online education. These influential publications emphasize critical areas of interest, including enrollment trends, self-regulated learning strategies, instructional quality, and retention factors [37], [40], [42], [44]. Collectively, they signify the importance of understanding learner engagement and course design in enhancing online education, as signified in Jordan [42]. As such, these studies serve as essential references for future research aimed at optimizing MOOC effectiveness and advancing the field of online learning.

In the author's keyword co-occurrence analysis, the different clusters underscores how MOOCs serve as a modern extension and evolution of traditional e-learning and distance learning paradigms, leveraging technology to expand educational access globally [55]. The interrelationship between these keywords further underscores their shared conceptual ground while focusing synergies in educational methodologies and technological infrastructures that underpin contemporary approaches to online education, reinforcing MOOCs' role as transformative tools in modern pedagogy. Further, in the green cluster, the keyword 'higher education' situates MOOCs within the context of tertiary education, indicating their relevance and adoption in university-level learning environments, where they serve as supplementary resources or complete courses for students globally [56]. 'Open educational resources' here underscore the ethos of accessibility and openness inherent in MOOCs, referring to freely accessible educational materials that educators and learners can share, reuse, and adapt [57]. Together, these keywords in the green cluster portray MOOCs as versatile tools that transcend traditional educational boundaries, offering diverse educational opportunities and resources to higher education learners regardless of geographic location or institutional affiliation [58]. Meanwhile, the keyword, 'self-regulated learning' refers to strategies that empower learners to take control of their educational journeys by setting goals, monitoring progress, and reflecting on outcomes [59]. This emphasis on autonomy and personalized learning aligns with MOOCs' flexibility and self-paced nature [60]. Further, 'learning analytics' involves collecting and analyzing data on learner behaviors and interactions within the MOOC environment. By leveraging these insights, educators and course designers can optimize instructional strategies, tailor content to individual needs, and enhance learning experiences [61]. Moreover, 'gamification,' the application of game-design elements in non-game contexts, is used in MOOCs to increase engagement and motivation by incorporating elements like points, badges, and leaderboards. Additionally, as discussed by Klemke *et al.* [62], the integration of gamification with learning analytics can provide more engaging and personalized MOOC experiences with real-time feedback and adaptive learning pathways, making the learning process more interactive and enjoyable for participants. Additionally, the red cluster illustrates a shift towards more nuanced and technologically advanced educational practices within MOOCs, focusing on personalized, data-informed, and engaging learning experiences. This evolution points to the future of MOOC research and development, where AI and learner-centered methodologies play pivotal roles in enhancing educational

effectiveness and accessibility. Overall, the network visualization reveals the interplay between various thematic domains and emerging technological trends shaping the trajectory of MOOC research.

4. CONCLUSION

The bibliometric mapping analysis of MOOC research from 2008 to 2023 reveals a significant upward trend in publications, indicating sustained interest in the field. Prominent contributors include China and the US, with notable contributions from other countries. Journals such as IRRODL lead in articles and citations, highlighting their influence. Further, the collaborative efforts among authors and diverse research topics, as evidenced by co-occurrence and co-citation networks, underscore the dynamic nature of MOOC research. Additionally, the evolving themes with the integration of AI technologies reflect the evolving landscape of MOOCs toward providing a more sophisticated and adaptive distance learning environment. Overall, these findings emphasize global engagement, collaboration, and the multidimensional nature of MOOC research, driving its continual advancement. Moreover, these findings underscore the importance of global engagement, collaboration, and the multidimensional aspects of MOOC research. Both policymakers, educators, and stakeholders can utilize these insights to make informed decisions regarding educational practices, resource allocation, and technological integration, ultimately enhancing the accessibility, effectiveness, and relevance of MOOCs in addressing diverse learning needs on a global scale. Furthermore, policymakers have a unique opportunity to utilize MOOCs to expand access to quality education, especially in underserved and remote regions. By prioritizing the development and implementation of MOOCs, they can make significant strides toward achieving SDG 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. This effort is particularly crucial for marginalized communities, where traditional educational resources may be limited or unavailable. By harnessing the potential of MOOCs, these communities can gain access to valuable educational content and opportunities, fostering more significant educational equity and contributing to sustainable development worldwide. Moreover, the integration of advanced technologies such as AI and learning analytics, as highlighted in the research, can further enhance the personalization and effectiveness of MOOCs. As MOOCs continue to evolve, ongoing research and collaboration will be vital in refining these technologies, and pedagogical approaches will ensure that MOOCs remain a dynamic and effective tool for global education. Additionally, the study's limitations regarding the database selection and exclusion criteria pave the way for future research directions. Future researchers can expand their bibliometric analysis using other popular software like BibExcel, CiteSpace, and Biblioshiny to conduct more comprehensive assessments of the evolving landscape of MOOC research. Additionally, exploring the impact of cultural and contextual factors on MOOC adoption and investigating the role of emerging technologies such as AI and augmented and virtual reality in MOOCs holds promise for enhancing learning experiences and outcomes.

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This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Kavitha Krishnan	✓	✓	✓					✓	✓	✓	✓			
Vazhayil Peedikayil Joshith	✓	✓								✓		✓		
Shana Chittakath	✓						✓			✓				
Sashi Ranjan	✓									✓				

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors state no conflict of interest.

DATA AVAILABILITY

The data supporting this study's findings are available from the corresponding author, [VPJ], upon reasonable request.

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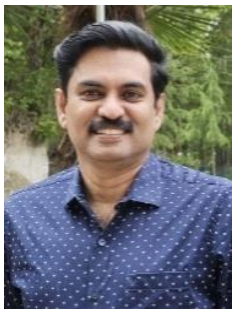

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