

Review Article

Journal of 'Computers & Education' from Past to Present: Bibliometric Analysis (1978-2025)

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Abstract

This study presents a comprehensive bibliometric analysis of Computers & Education, a leading academic journal in the field of educational technology, covering the period from 1978 to 2025. Drawing upon data from the Web of Science database, a total of 4,715 articles were examined using bibliometric techniques, including co-citation, co-authorship, keyword co-occurrence, and thematic evolution analysis. The findings reveal a significant increase in publication volume and citation rates, particularly after 2008, indicating a growing scholarly interest in digital education. Thematic clustering analyses identified three dominant research foci: student performance and achievement, technology-enhanced learning and motivation, and user acceptance and self-efficacy. Furthermore, collaboration networks show that Taiwan, China, the USA, and the UK are central hubs in the global educational technology research landscape. Thematic evolution analysis reveals a paradigm shift from early discussions on "computer and distance education" toward more recent emphases on "digital content," "virtual learning," and "student-centered design." This study contributes to the literature by mapping structural patterns and identifying key trends, prolific authors, institutions, and countries, offering a macro-level understanding of how Computers & Education has shaped the educational technology discourse over nearly five decades.



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Introduction

In today's world, digitalisation is transforming educational environments and the integration of technology into learning processes is becoming increasingly widespread. There is now a global consensus that educational technologies have a positive effect on student achievement (Lee et al., 2020; Patel et al., 2018). This transformation brings new responsibilities for educators and researchers, and academic studies on the role, effects and applicability of technology in education are becoming increasingly important. In this context,

systematically evaluating scientific knowledge production is important for monitoring development and trends in the field.

Since 1978, *Computers & Education*, a leading journal in the field of educational technology, has made significant contributions to scientific developments in this area by publishing experimental and theoretical studies. However, there have been few comprehensive bibliometric analyses revealing the temporal, thematic and structural development of the studies published in this journal. Such an analysis is necessary to reveal the journal's historical development, research trends, prominent themes and collaboration networks.

This study uses bibliometric methods to examine the articles published in *Computers & Education* and present a structural map of the literature related to the use of this journal in education. Thus, past research trends are analysed and thematic gaps are identified to inform future research. While many studies in this field are based on reviews of books, conference papers and articles, this study contributes to the field by presenting a systematic bibliometric analysis specific to this journal.

Computers & Education

In the contemporary era, marked by an escalating integration of technology within educational paradigms, a pervasive global consensus has emerged regarding the efficacy of educational technology in enhancing student academic achievement (Patel et al., 2018). This paradigm shift, characterized by the integration of technology into various facets of contemporary life, has profound implications for educators and researchers, who are entrusted with significant responsibilities in this regard. A rigorous examination and evaluation of the use of educational technologies in the learning process, the extent of their effects, and their applicability, is imperative and should be undertaken through academic research. At this juncture, it is imperative to disseminate the research findings to educational practitioners. Journals and organizations that publish academic studies assume a pivotal role in the dissemination of knowledge and the advancement of educational technologies. It is also paramount that these studies be conducted in a systematic manner and handled with the utmost rigor. In this regard, numerous international academic journals are dedicated to the publication of research in the domain of educational technologies.

Significance of the Study and Research Questions

The education sector has undergone a significant transformation due to digitalisation. In this context, computer- and technology-based applications have become an integral part of the educational infrastructure. These developments have led to increased interest in computer-assisted instructional technologies at theoretical and practical levels. A large body of research has examined the impact of computers on learning processes, including numerous experimental studies (Dağdalan et al., 2024; Kantar & Özpınar, 2023; Öztuzcu & Mısırlı, 2023; Taşdemir, 2023). However, these studies have generally focused on specific technological tools, limited sample groups or short-term effects. Despite the substantial body of work in this area, particularly in the *Computers & Education* journal, there are few comprehensive bibliometric studies analysing the historical development, thematic focus, collaborative networks and scientific impact of the literature holistically.

The publication history of *Computers & Education*, a prestigious journal in this field, from 1978 to the present day, offers valuable insights into the evolution of the discipline. However, it is noteworthy that there has been a lack of systematic analyses mapping trends in this journal in terms of temporal and conceptual dimensions. Against this backdrop, this study aims to examine the literature in *Computers & Education* from a bibliometric perspective, drawing a structural map of existing studies on the journal's use in education. This will make an important academic contribution to our understanding of past research trends and help to identify thematic gaps that will inform future studies.

National and international studies evaluating articles, books and conference papers published in *Computers & Education* are predominant. This observation highlights the necessity of contemporary bibliometric studies in the field of 'Computers and Education'. The present study examines the existing literature in the *Computers & Education* journal from a bibliometric perspective, mapping current studies related to its use in education. The following research questions were examined in this context:

1. Which authors are most influential within the field of 'Computers & Education' journal?
2. Which universities and countries are most influential within the field of 'Computers & Education'?
3. What is the status of citations in 'Computers & Education' in education?
4. What are the keywords and trending topics in 'Computers & Education'?

5. How do clusters emerge according to author matching in 'Computers & Education' journal research?

The academic journal *Computers & Education* has been a leading publication in its field since 1978, specializing in experimental and theoretical studies related to computers. It is an irrefutable fact that the studies conducted within this journal have contributed significantly to the realm of scientific research. Consequently, a bibliometric analysis of this highly successful journal from its inception to the present will offer valuable insights into future research directions.

Methodology

The objective of this study was to undertake a systematic review of the extant academic literature pertaining to the journal *Computers & Education*, with a focus on bibliometric and thematic analysis. The research process was structured in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2009) and consisted of four main stages: (1) determining inclusion and exclusion criteria, (2) literature review and study selection, (3) data extraction, and (4) bibliometric analysis.

Inclusion and Exclusion Criteria

In accordance with the objective, a series of scope determination criteria, incorporating content and methodological criteria, has been formulated. Within this framework, the study encompasses articles published in the *Computers & Education* journal between 1978 and 2025 (February). In order to enhance the scientific validity and reliability of the study, the selected articles were identified from publications indexed in the Web of Science (WoS) database (Falagas et al., 2008; Mongeon & Paul-Hus, 2016). The integration of prominent, internationally renowned academic journals within the Web of Science database enabled a meticulous and contemporary literature review on the subject (Zupic & Čater, 2015). The present study encompasses articles for which the full text is available. The scope of this study encompasses document types that are not included in the analysis. These include book chapters, conference proceedings, publications without full text, and unpublished documents. This exclusion was applied with the objective of ensuring data integrity and enhancing the comparability of the analysis (Moher et al., 2009).

Data Screen

A systematic extraction process was applied to obtain bibliographic data such as publication year, author(s), country, institution, number of citations, journal of publication, keywords, and abstracts from the selected studies. The obtained data were transferred to the Bibliometrix (R-Biblioshiny) software for bibliometric analysis. The dataset utilised in the analysis was standardised in plain text format as required by the software (Aria & Cuccurullo, 2017). The data screening and pre-processing process was structured as a systematic narrowing process consisting of several sequential steps to ensure that the literature most appropriate to the scope of the study was selected. The purpose of these steps was twofold: firstly, to maintain the methodological and content integrity of the literature, and secondly, to create a high-quality sample for analysis.

Data Analysis

During the analysis process, the distribution of publications by year, the most prolific authors and institutions, geographical distribution, frequently used keywords, citation counts, networks of relationships between sources, and academic collaboration models were examined in detail. Conceptual structures were identified using methods such as "synchronisation", "co-citation", and "source matching", and concept maps and collaboration networks were created accordingly. In the analysis, the software tool employed in the study was utilised to evaluate strategic theme maps, theme densities, and time-dependent development trends. The descriptive findings related to the examined publications are presented in Table 1.

Table 1. Descriptive data of obtained studies

Description	Results
Timespan	1978:2025 (February)
Sources (<i>Computers & Education</i>)	1
Documents	4715
Annual average number of publications	100.31
Average citations per doc	50.85
Total references	136997
Keywords Plus (ID)	3257
Author's Keywords (DE)	5348
Authors	10158
Authors of single-authored docs	797
Authors of multi-authored docs	9361
Single-authored docs	947
Co-Authors per Doc	2.88
International co-authorships (%)	14.87

Results

The annual scientific production related to the study is illustrated in Figure 1, which shows an average of 44 articles from 1978 to 2000, and an increase to 136 from 2000 to 2012. The average between 2012 and 2025 was determined to be 162. Of particular note is the substantial increase observed after 2013. The number of citations received by the articles according to the years in which they were published can be seen in Figure 2.

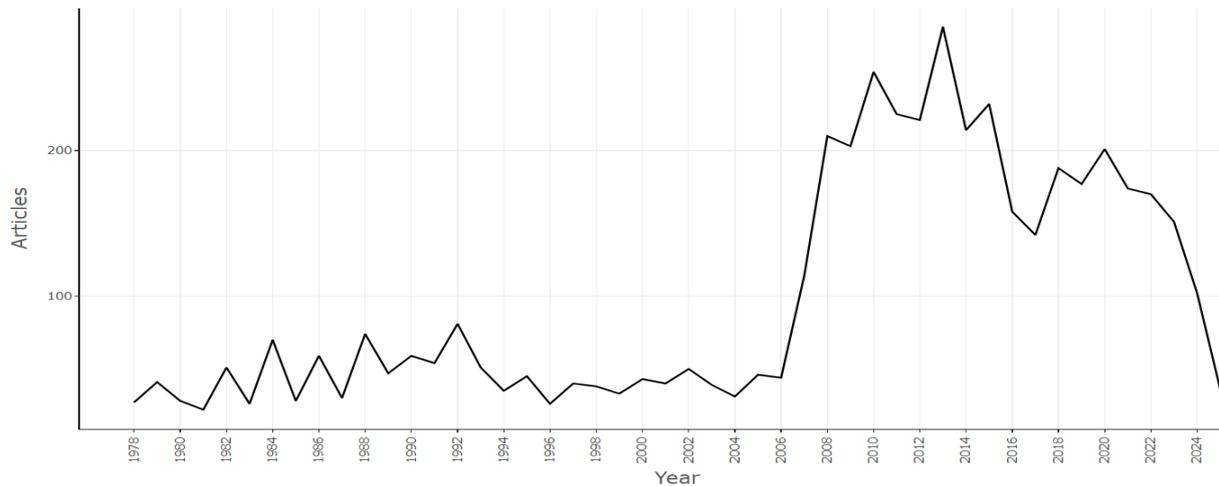


Figure 1. Annual scientific production

As demonstrated in Figure 2, the number of citations received by 4,715 published articles from 1978 to 2025 was examined. The average number of citations received between 1978 and 2000 was determined to be 43.82, whereas between 2000 and 2012, this average increased to 123.08. The average number of citations between 2012 and 2025 was 171.5, and it was understood that in 2020 the number of citations reached its peak. The Three-Field Plot (author-keyword-affiliation) is given in Figure 3.

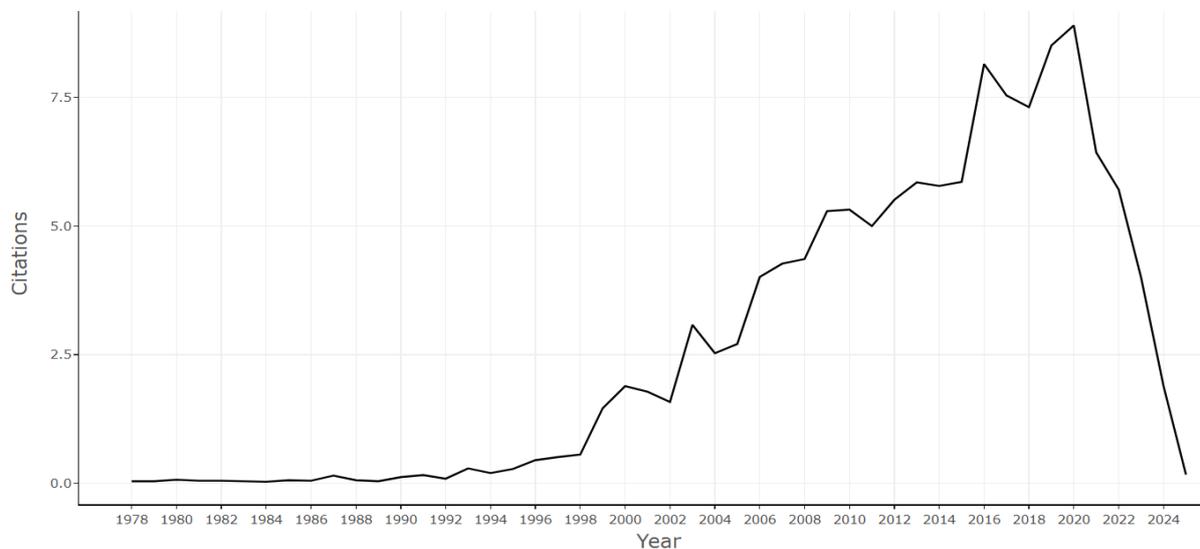


Figure 2. Annual scientific production

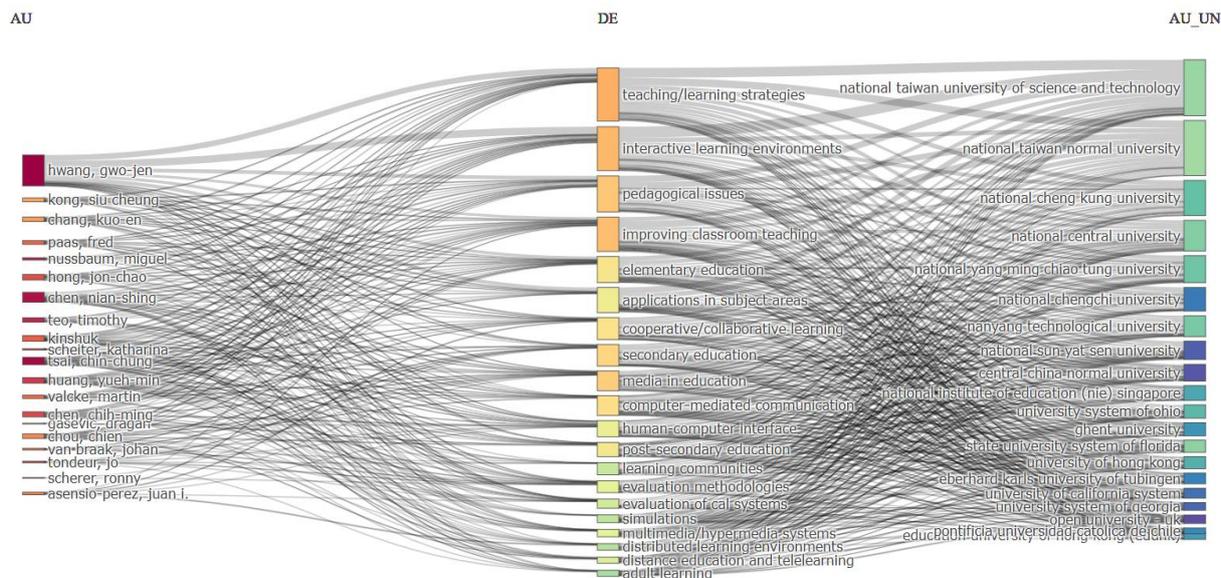


Figure 3. Three-field plot (keyword-author-affiliation)

Sources

A total of 4,715 articles have been published in the Computers & Education journal in the Web of Science database. The most locally cited sources are presented in Figure 4. Among the top 10 journals, Computers & Education ranks first with 15,717 citations, followed by Computers in Human Behaviour with 4,855 citations and the British Journal of Educational Technology with 2,431 citations.

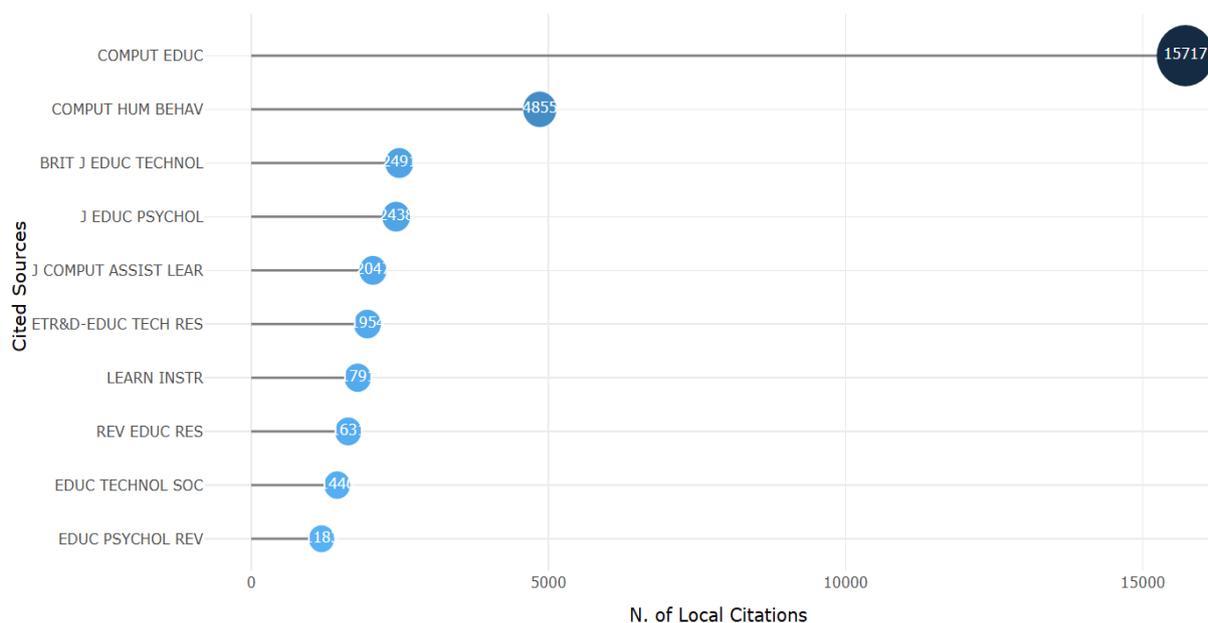


Figure 4. Most local cited sources

Figure 5 presents a visual representation of the annual publication of articles in the journal 'Computers & Education' as indexed in the Web of Science database. A linear increase is observed in the data from 1978 to 2025, with a particularly pronounced increase after 2008.

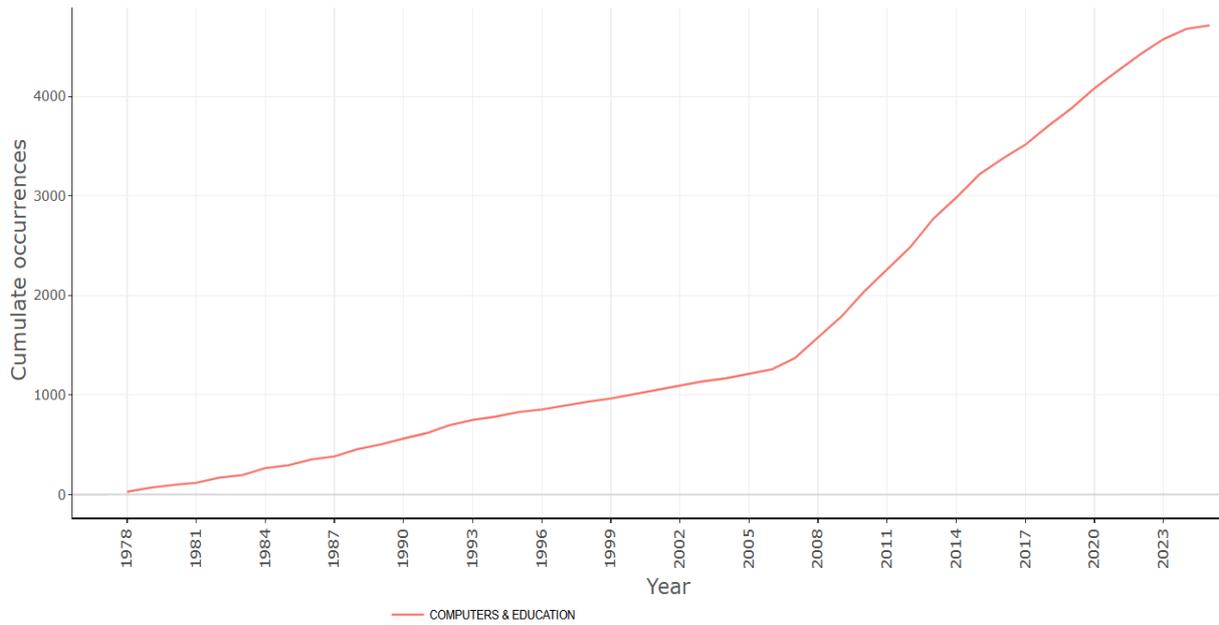


Figure 5. Sources' production over time

Authors

A total of 10,158 researchers who had published in the journal 'Computers & Education' were identified in the Web of Science database. The 10 authors who had published the most in the journal are presented in Figure 6. When Figure 6 was analysed, Hwang, Gwo-Jen was found to have published 70 studies, placing him in first position. Tsai, Chin-Chung was in second position, having published 29 studies, and Chen, Nian-Shing was in third position, with 25 studies.

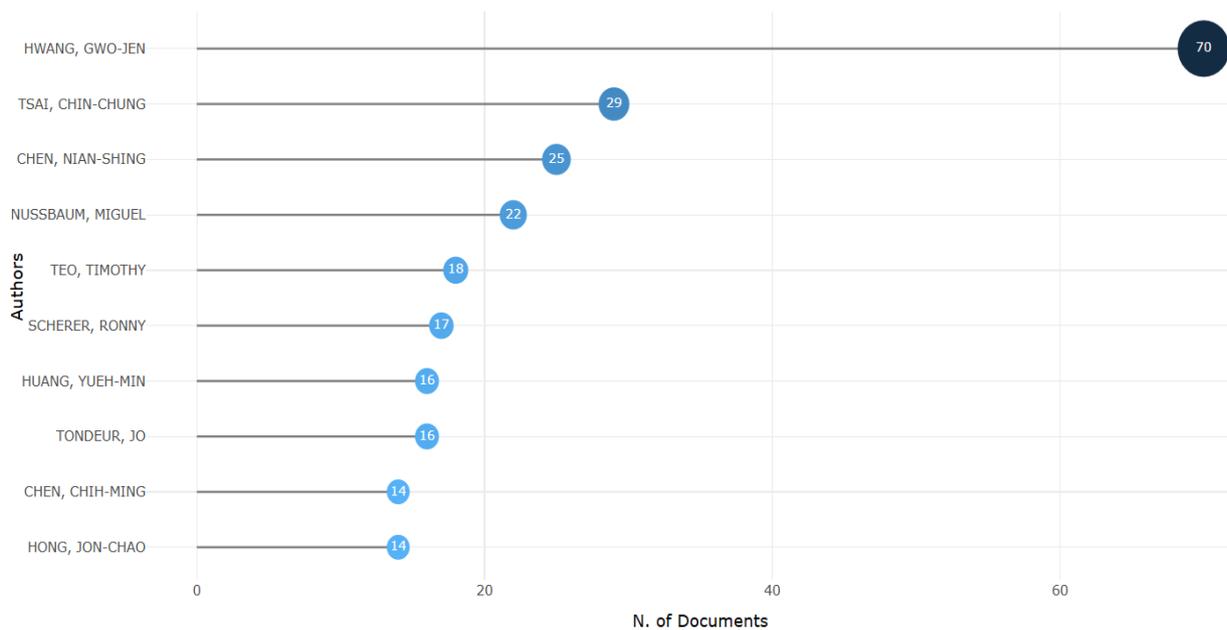


Figure 6. Most relevant authors

As illustrated in Figure 7, an analysis of the Web of Science database reveals the 10158 researchers who received the highest number of local citations for publications in the 'Computers & Education' journal. The analysis demonstrates that Hwang, Gwo-Jen has received 466 citations, placing him at the top of the list. In second position is Tsai, Chin-Chung with 326 citations, followed by Tondeur, Jo with 146 citations.

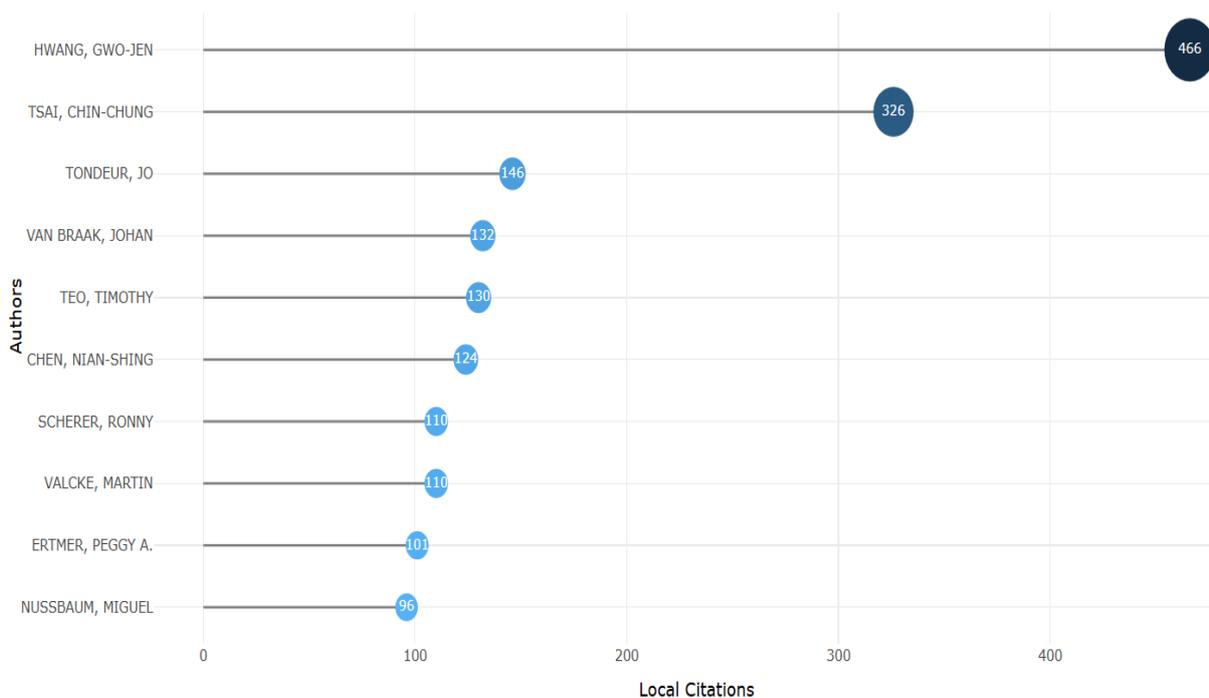


Figure 7. Most local cited authors

The following study analyses the authors publishing in the journal 'Computers & Education' according to the years (cf. Figure 8). An analysis of Figure 8 indicates that Hwang, Gwo-Jen, who made the most publications, was most active between 2008 and 2025, with the highest number of publications in 2023. A similar analysis of the publications of Tsai, Chin-Chung, who is the second most prolific author, reveals a concentration of publications between 2007 and 2022. Chen, Nian-Shing, the third most prolific author, demonstrates a similar concentration of publications between 2008 and 2025.

Affiliations

As illustrated in Figure 8, the universities with the highest number of publications are National Taiwan Normal University (168 studies), National Taiwan University of Science and Technology (132 studies), and State University System of Florida (96 studies).

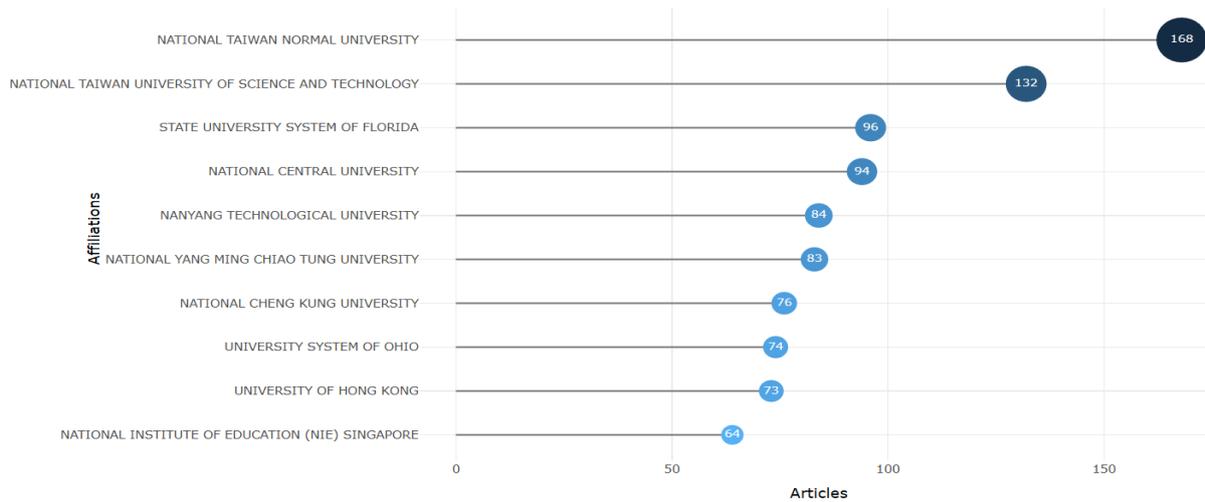


Figure 8. Top 10 universities with the most articles

Figure 9 provides a visual representation of the production of the organisations publishing in 'Computers & Education' magazine over time. An analysis of Figure 10 reveals a stable situation until 2002. However, after 2002, there has been an upward trend, with a particularly rapid acceleration being gained after 2007.

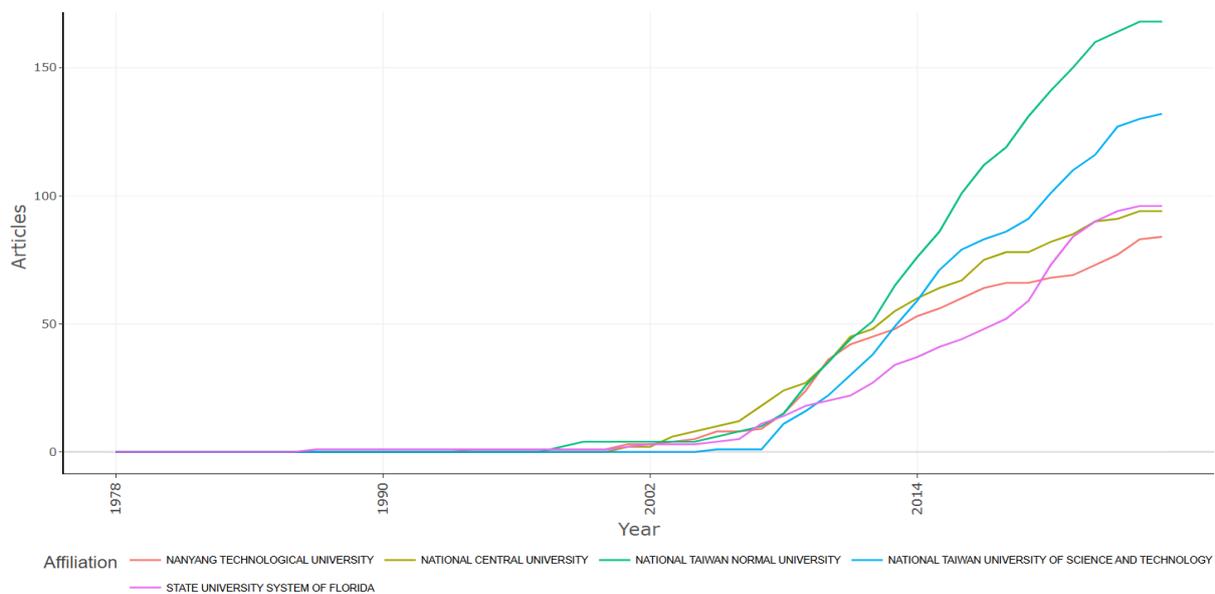


Figure 9. Affiliations' production over time

Countries

As illustrated in Figure 10, the countries of the responsible authors publishing in the journal 'Computers & Education' are as follows: China is ranked first with 914 articles, the USA is ranked second with 912 articles, and the United Kingdom is ranked third with 532 articles.

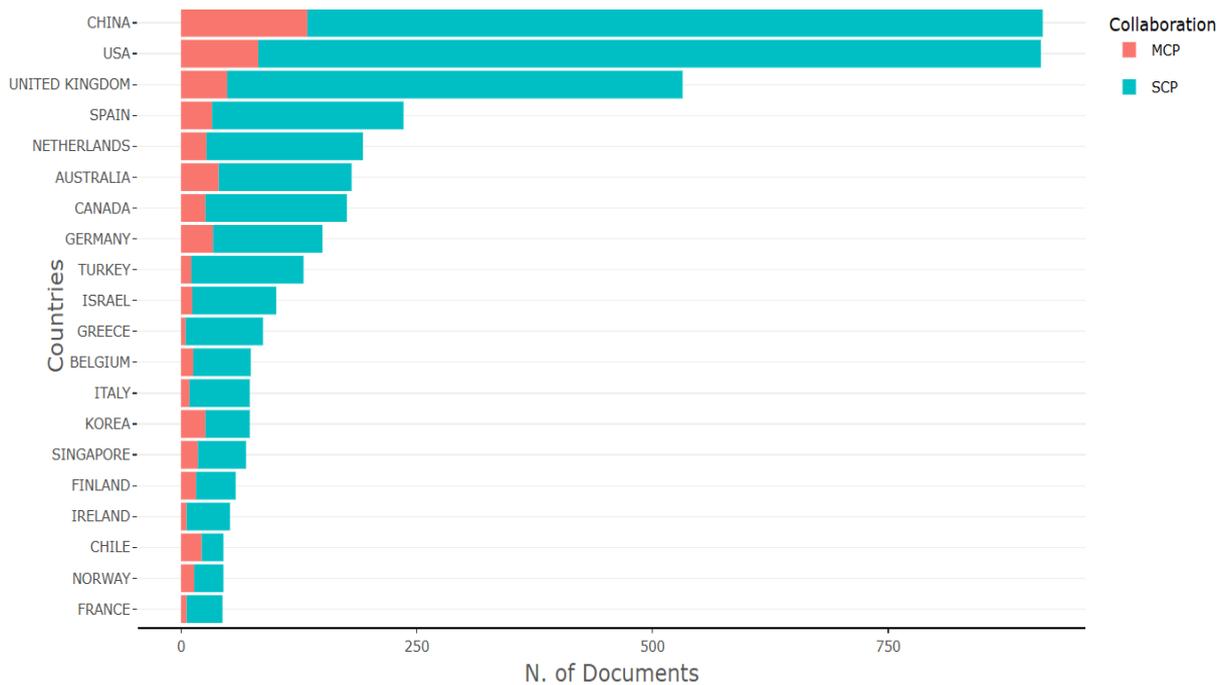


Figure 10. Corresponding author's countries

Notes: MCP=Multiple Country Publications; SCP = Single Country Publications. China and Taiwan are merged into (China) as the software used treats both the Republic of China (Taiwan) and People’s Republic of China (Mainland China) as one country.

The distribution of the number of citations of articles published in the journal Computers & Education according to countries is presented in Figure 11. An analysis of Figure 12 reveals the top 10 countries. China ranks first with 58,969 citations, the USA ranks second with 48,523 citations, and Spain ranks third with 16,206 citations.

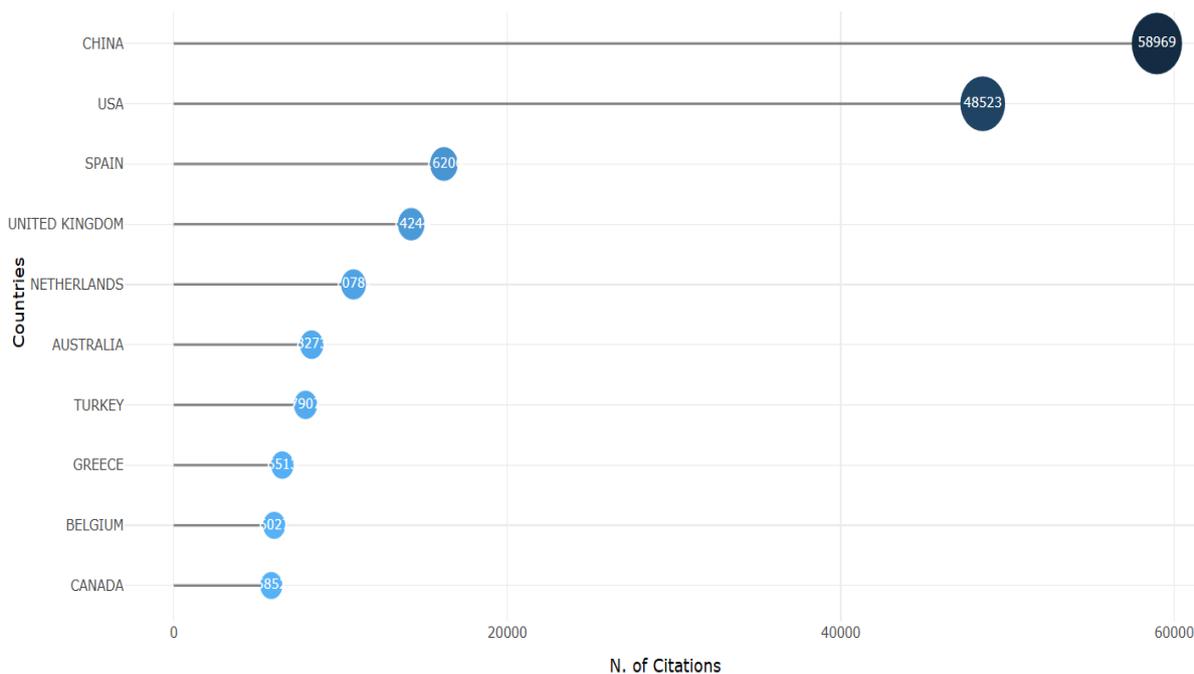


Figure 11. Top 10 countries with the most articles

Documents

The most globally cited articles related to the articles published in the 'Computers & Education' journal are given in Table 3. The first article with 1,384 citations is 'What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction'. The second most frequently cited article, published in 2013, is entitled 'Current status, opportunities and challenges of augmented reality in education' by Hsin-Kai Wu, Silvia Wen-Yu Lee, Hsin-Yi Chang and Jyh-Chong Liang, with a citation count of 1146. The third most frequently cited article, also published in 2013, is entitled 'Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance'.

Table 3 Most global cited documents

Document	DOI	Total Citations	T C per Year
Sun Pc, 2008,	10.1016/j.compedu.2006.11.007	1384	76.89
Wu Hk, 2013,	10.1016/j.compedu.2012.10.024	1146	88.15
Hanus Md, 2015	10.1016/j.compedu.2014.08.019	963	87.55
Domínguez A, 2013	10.1016/j.compedu.2012.12.020	958	73.69
Papastergiou M, 2009	10.1016/j.compedu.2008.06.004	884	52.00
Ertmer Pa, 2012	10.1016/j.compedu.2012.02.001	860	61.43
Merchant Z, 2014	10.1016/j.compedu.2013.07.033	858	71.50
Scherer R, 2019	10.1016/j.compedu.2018.09.009	756	108.0
Sung Yt, 2016	10.1016/j.compedu.2015.11.008	749	74.90
So Hj, 2008	10.1016/j.compedu.2007.05.009	625	34.72
Junco R, 2012	10.1016/j.compedu.2011.08.004	613	43.79
Liaw Ss, 2008	10.1016/j.compedu.2007.09.005	605	33.61
Macfadyen Lp, 2010	10.1016/j.compedu.2009.09.008	594	37.13
Di Serio A, 2013	10.1016/j.compedu.2012.03.002	587	45.15
Angeli C, 2009	10.1016/j.compedu.2008.07.006	586	34.47
Ainsworth S, 1999	10.1016/S0360-1315(99)00029-9	572	21.19
Cheon J, 2012	10.1016/j.compedu.2012.04.015	567	40.50
Romero C, 2008	10.1016/j.compedu.2007.05.016	552	30.67
Teo T, 2009	10.1016/j.compedu.2008.08.006	532	31.29
Van Raaij Em, 2008	10.1016/j.compedu.2006.09.001	525	29.17

The most locally cited articles related to the articles published in the 'Computers & Education' journal are enumerated in Table 4. The first article with 62 citations is 'Digital Game-Based Learning in High School Computer Science Education: Impact on Educational Effectiveness and Student Motivation' by Marina Papastergiou in 2009. In second place with 53 citations is the article entitled 'Teacher Beliefs and Technology Integration Practices: A critical relationship' in 2012. The third most cited article, with 51 citations, is 'What drives a successful e-Learning?' by Pei-Chen Sun, Ray J. Tsai, Glenn Finger, Yueh-Yang Chen and

Dowming Yeh in 2008. This article is an empirical investigation of the critical factors influencing learner satisfaction.

Table 4. Most local cited documents

Document	DOI	TotalCitations	TC per Year
Papastergiou M, 2009,	10.1016/j.compedu.2008.06.004	2009	62
Ertmer Pa, 2012	10.1016/j.compedu.2012.02.001	2012	53
Sun Pc, 2008	10.1016/j.compedu.2006.11.007	2008	51
Angeli C, 2009	10.1016/j.compedu.2008.07.006	2009	42
Weinberger A, 2006	10.1016/j.compedu.2005.04.003	2006	40
De Wever B, 2006	10.1016/j.compedu.2005.04.005	2006	39
Ebner M, 2007	10.1016/j.compedu.2005.11.026	2007	35
Ngai Ewt, 2007	10.1016/j.compedu.2004.11.007	2007	34
Hermans R, 2008	10.1016/j.compedu.2008.02.001	2008	34
Rosas R, 2003	10.1016/S0360-1315(02)00099-4	2003	33
Zurita G, 2004	10.1016/j.compedu.2003.08.005	2004	33
So Hj, 2008	10.1016/j.compedu.2007.05.009	2008	33
Hwang Gj, 2011	10.1016/j.compedu.2010.12.002	2011	33
Merchant Z, 2014	10.1016/j.compedu.2013.07.033	2014	33
Li N, 2007	10.1016/j.compedu.2005.01.007	2007	32

The word cloud obtained from the articles published in the *Computers & Education* journal is presented in Figure 13. The visual representation elucidates the key themes and focal points within the journal's publication landscape. It is noteworthy that the terms "students", "education", "performance", "technology" and "motivation" are among the most prevalent keywords, suggesting that the primary focus of the journal is centered on student-centered learning processes and the integration of technology into educational settings. It is evident that other frequently occurring terms such as "knowledge", "impact", "design", "model", "teachers" and "online" suggest a strong research interest in pedagogical strategies, digital learning environments, instructional design, and the role of educators in technology-enhanced learning. The employment of concepts such as "self-efficacy," "engagement," "attitudes," and "perceptions" underscores an emphasis on the psychological and affective dimensions of learning, thereby further substantiating the journal's commitment to achieving holistic educational outcomes. Furthermore, the utilisation of keywords such as "framework," "science," "gender," "skills," and "achievement" is indicative of the interdisciplinary and inclusive approach adopted by the journal. This thematic diversity serves to illustrate *Computers & Education's* role as a leading platform for exploring how digital innovations intersect with educational theory, practice, and learner outcomes across various domains.



Figure 12. WordCloud

The alteration of the words in the articles published in the journal 'Computers & Education' according to time is demonstrated in Figure 13.

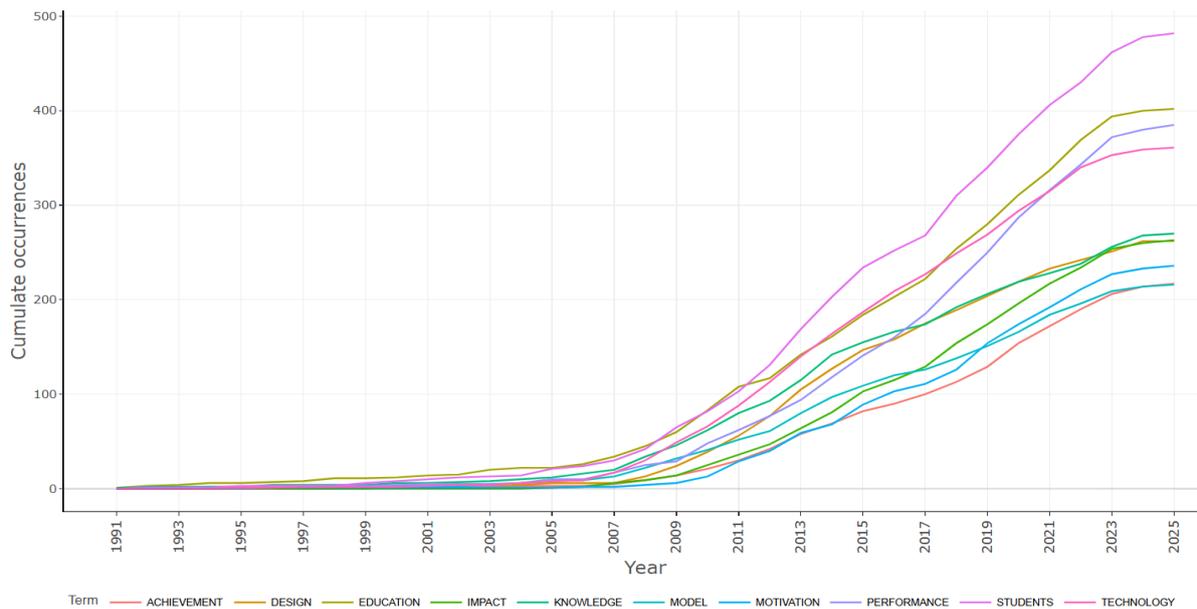


Figure 13. Words' frequency over time

Figure 14 presents a visual representation of the trend topics of the articles published in the 'Computers & Education' journal according to years. An analysis of Figure 14 reveals that, between 1198 and 2012, the trending topics included students (482), education (402), technology (361), design (262) and model (216). Subsequent to 2013, the most prevalent trending topics were performance (385), impact (263), motivation (236), online (201) and science (190).

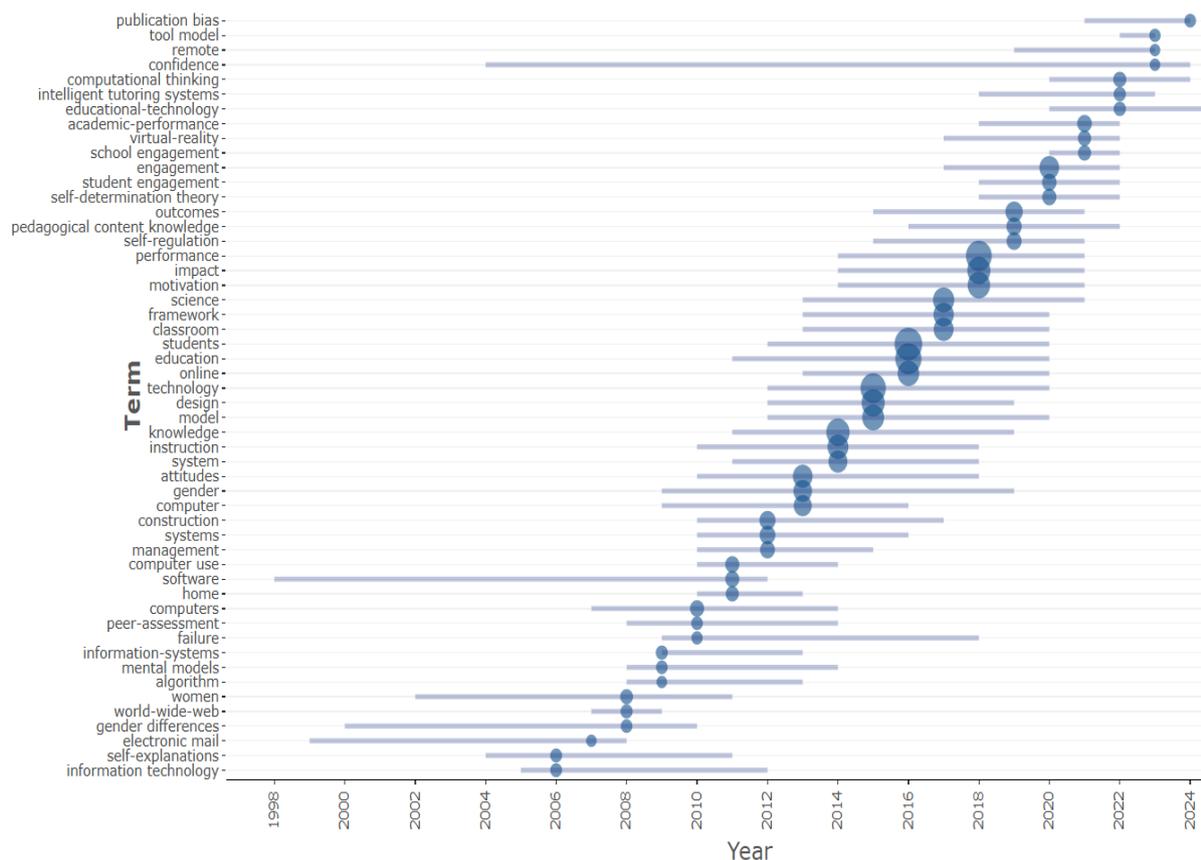


Figure 14. Trend topics (keywords)

Clustering by Coupling

In this study, an analysis of articles published in the journal *Computers & Education* was conducted using a clustering analysis based on documents by year (see Figure 15). The analysis yielded three overarching thematic clusters. The initial cluster, predominantly centered around the concepts of "performance" (45% confidence level), "success" (58.6%), and "students" (44.7%), encompasses studies focused on learning outcomes and student-centered assessment criteria. The second cluster is represented by terms such as "education" (41%), "technology" (32.5%), and "motivation" (37.5%), which collectively denote research on the digitization of teaching environments and the utilization of technological tools to support learner motivation. The third cluster emphasizes the concepts of "information technology" (83.3%), "user acceptance" (78.4%), and "self-efficacy" (67.6%). These concepts are particularly salient, reflecting a structure where studies focusing on individuals' perceptions of technology, acceptance levels, and cognitive competencies are concentrated. The thematic clustering of the studies published in the journal indicates a diversification of outcomes, with a focus on pedagogical results, technology integration, and user experience.

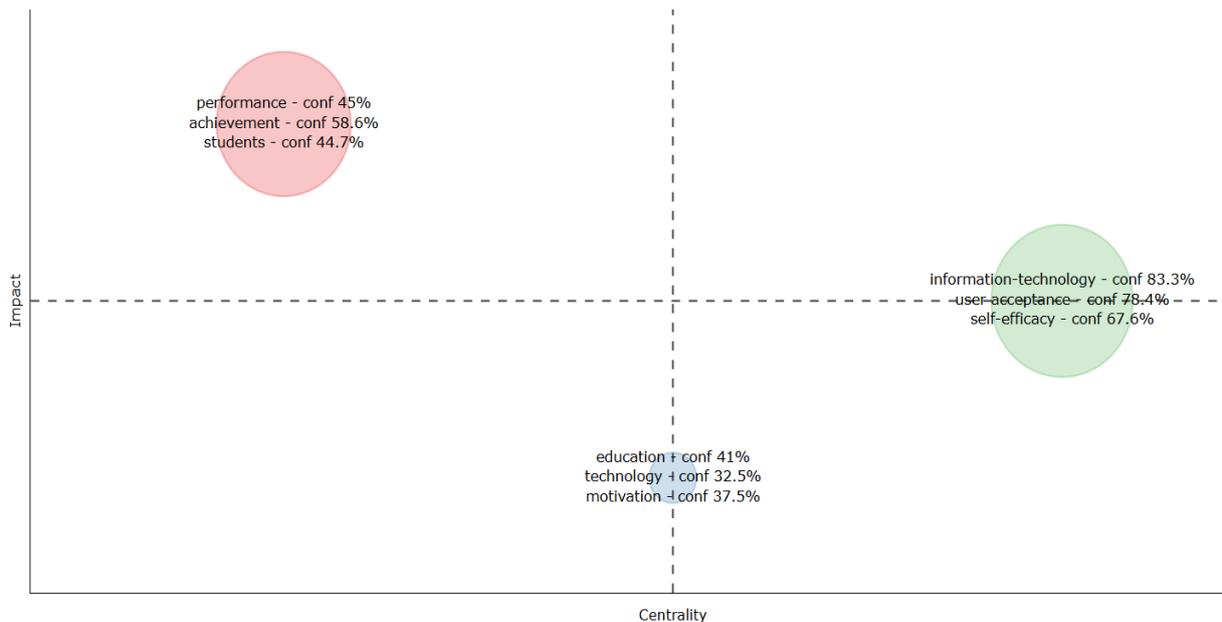


Figure 15. Clustering according to documentation

The analysis of the clustering of articles published in the journal 'Computers & Education' according to authors over the years is presented in Figure 16.

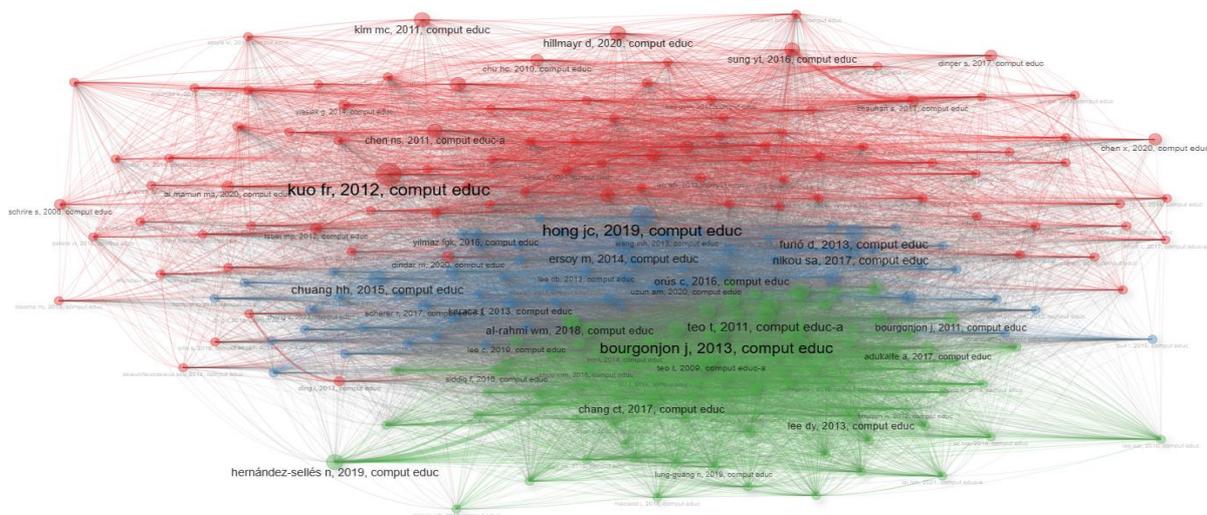


Figure 16. Clustering according documents

Co-occurrence Network

The co-occurrence network formed by keywords published in the journal 'Computers & Education' according to the titles over the years was analysed and presented in Figure 17. In this study, the "keyword co-occurrence network" created with the objective of mapping the utilization of literature published in the journal Computers & Education in education from a bibliometric perspective reveals that the research trends in the journal are shaped around two primary thematic axes. The blue cluster on the left side of the network signifies a

The co-occurrence network formed by the articles published in the journal 'Computers & Education' according to the titles over the years was analysed and presented in Figure 18. When Figure 18 was analysed, it was found that the words 'learning, e-learning, web-based, design, collaborative, virtual, evaluation, environments' formed a network together, and the words 'students, impact, skills, support, game, school, study' formed a network together. In a similar manner, the terms 'online, performance, social, cognitive, effects, academic, engagement' formed a network, whilst the terms 'teachers, ICT, information, technology, literacy' formed a separate network.

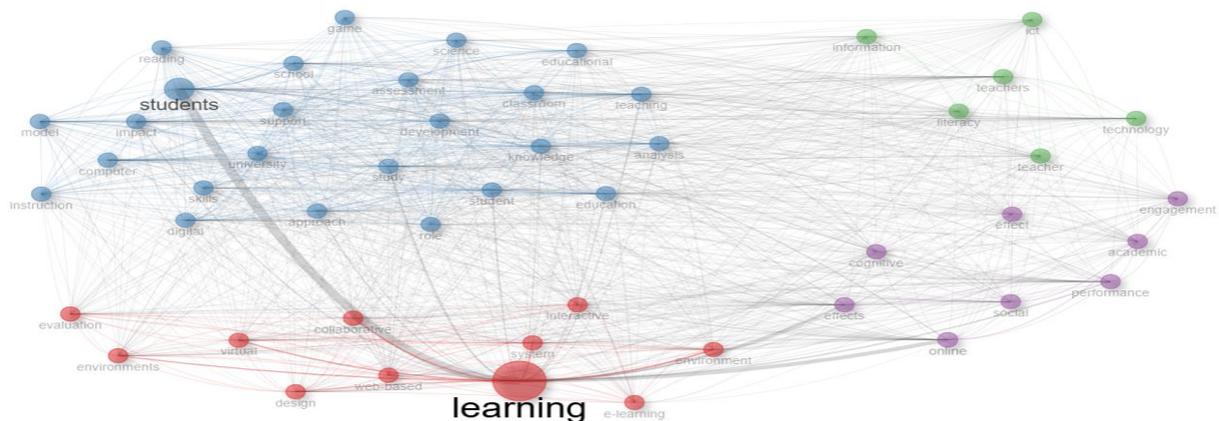


Figure 18. Co-occurrence network by titles

An analysis was conducted of the thematic map formed by the articles published in the journal 'Computers & Education' according to the keywords over the years (see Figure 19). The analysis revealed that the keywords 'students' (482), 'education' (402), 'performance' (385), 'technology' (361), 'knowledge' (270) and 'impact' (263) formed a very close thematic map.

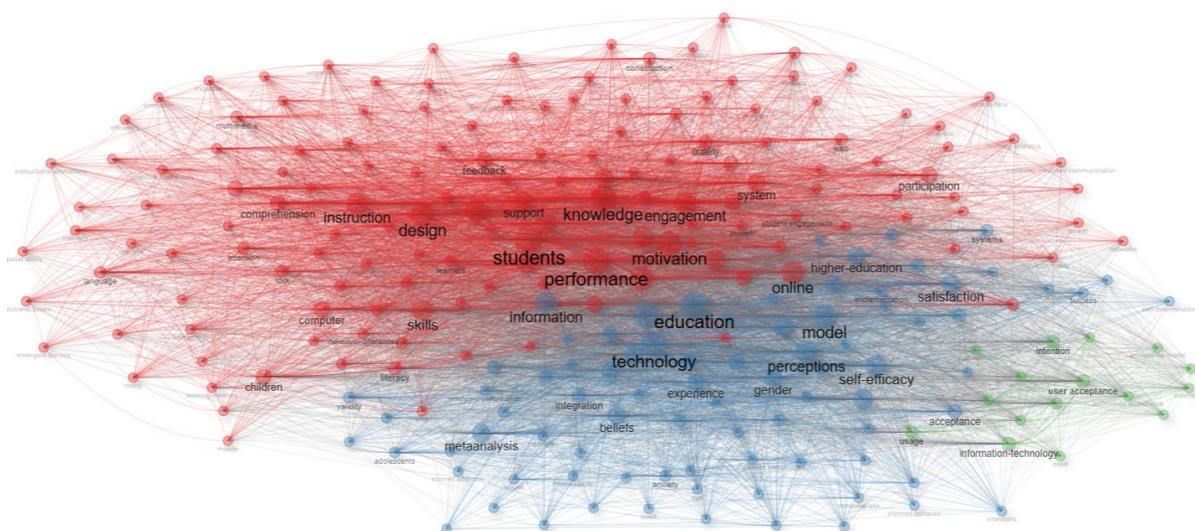


Figure 19. Thematic map by key words

This diagram illustrates the thematic evolution of studies published in the journal *Computers & Education* over time, demonstrating the interrelatedness of key concepts from 1978 to 2025. In this context, the temporal development of the literature has been examined in three main periods: 1978–2000, 2001–2012, and 2013–2025. The keywords that emerged during the initial period (1978–2000) were "computer," "distance," and "teaching." This period signifies the inaugural phase of the integration of computers into education, with theoretical and practical studies on distance education and teaching methods at the forefront. The prevailing themes of this era center on the examination of technology's fundamental applications and their repercussions on pedagogical methodologies.

By the period of 2001–2012, the concepts of "learning" and "education" became central. This shift signifies an augmentation in the number of studies that are concentrating on learning processes and pedagogical approaches as opposed to technological tools. It is evident that the concepts of the preceding period, such as "computer" and "distance," have been integrated with "learning" and "education" in this new phase. This shift signifies a transition from a tool-based paradigm to a learning-centered model. In the most recent period, 2013–2025, the concept of "learning" has maintained its continuity, while new digital age themes such as "digital," "content," and "virtual" have come to the fore. This indicates that with the advent of digital technologies in the educational sector, the production of content, the development of virtual learning environments, and the integration of digital pedagogies have assumed significant importance.

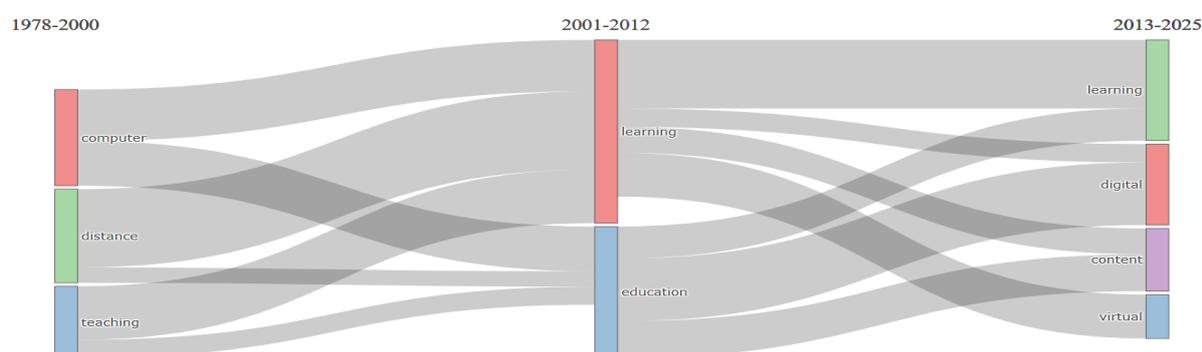


Figure 20. Thematic evolution by key words

The advent of the concept of "virtual" during this period, drawing upon the theme of "education," signifies the ascent of virtual learning environments as a discrete dimension within the domain of educational technology literature. A comprehensive analysis of the thematic evolution of the literature in the *Computers & Education* journal reveals a transition

from a technology-centered beginning to a focus on pedagogical depth and, subsequently, to the digital transformation process. This shift unmistakably signifies that education in the digital era has undergone a comprehensive reformation in both theoretical and practical dimensions. Concurrently, research trends have evolved in tandem with this transformation.

Co-citation Network

The co-citation networks formed by the articles published in the journal 'Computers & Education' over the years were analysed according to the documents and presented in Figure 21. The co-citation network analysis of the sources that are jointly cited in studies published in the journal *Computers & Education* reveals the conceptual and theoretical foundations of the literature. This network demonstrates the frequency with which specific sources are cited in conjunction, thereby elucidating the epistemological foundation of the field and the domains of interdisciplinary interaction. The initial salient feature in the visual is the central placement of the Davis (1989) study. This study is particularly known for the Technology Acceptance Model (TAM), which is the most cited document in the network. The TAM demonstrates that it is a determinant of the theoretical foundation of the educational technology literature. Its extensive interconnections with other seminal works, including those by Fornell (1981), Venkatesh (2003), and Hu (1999), underscore the prevailing thematic frameworks within the extant literature concerning subjects such as user acceptance, technology integration, and structural equity models. This structure is indicative of the methodological and theoretical foundations that are frequently referenced in studies related to technology acceptance, user behavior, and system design in educational environments.

Among the prominent names in other parts of the network, authors such as Bandura (1977, 1997) and Cohen (1988) contribute to the behavioral and statistical aspects of the literature through psychopedagogical concepts such as self-efficacy and influence magnitude. This finding underscores the efficacy of employing psychological theories in the assessment of learner behavior. Classical educational theorists such as Vygotsky (1978), Papert (1980), and Brown (1989), located in the upper region of the network, demonstrate how structuralist and sociocultural approaches to learning are being re-examined in an integrated manner with technology. The integration of these works underscores the dual nature of the *Computers & Education* literature, which is not only technology-based but also firmly rooted in pedagogy.

development underscores Taiwan's emergence as a prominent academic production hub, both regionally and globally, within the domain of educational technologies.

Another prominent institution of higher education in Asia, Nanyang Technological University, is distinguished by its substantial productivity and its extensive network of affiliations with various academic and research institutions. Institutions such as National Chengchi University, National Tsing Hua University, and National Changhua University of Education, located in proximity to these institutions, are also part of the same collaboration cluster, indicating the existence of a Taiwan-based research network. Conversely, the United States' own systems, such as the State University System of Florida, the University System of Ohio, and the University System of New York (SUNY), constitute an independent cluster. This structure indicates that state-based university systems in the US engage in collaborative efforts to produce publications.

Universities from countries such as Australia, the Netherlands, Belgium, Germany, and Spain are more dispersed but still form specific clusters; institutions such as the University of Sydney, University of London, and University of Twente serve as regional hubs connecting to different academic networks. This map generally reveals that, in terms of inter-institutional interaction in the literature published in the journal *Computers & Education*, Asian institutions, particularly those based in Taiwan and Singapore, and state-based university systems in the US are dominant. The multi-centered, transnational, and interdisciplinary character of these collaborations is a significant indicator of the journal's global academic influence. This phenomenon signifies an escalating internationalization of research in educational technology, characterized by its dissemination on a global scale.

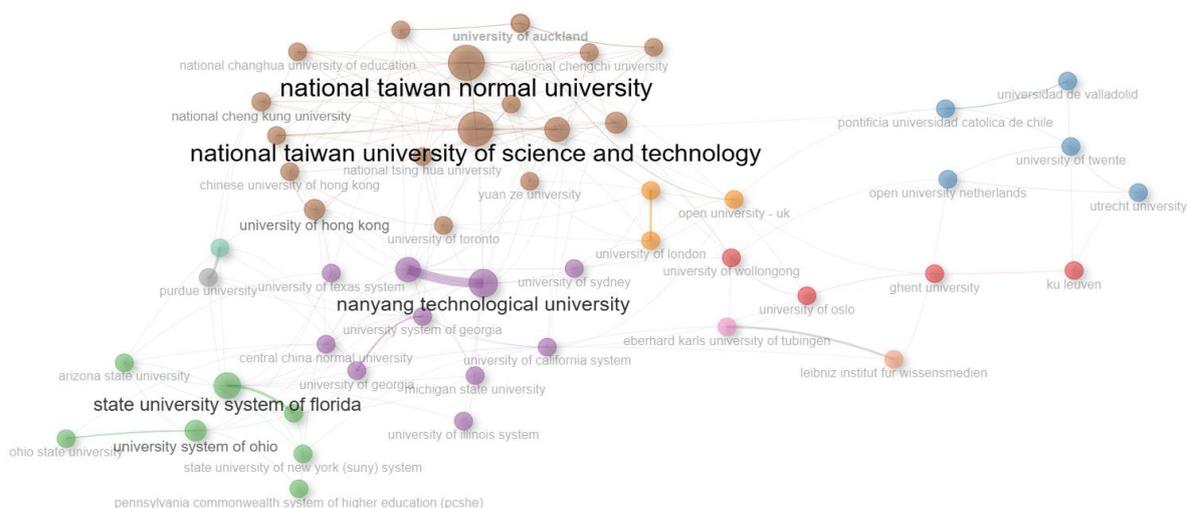


Figure 22. Institutions-collaboration network

The countries publishing in the journal 'Computers & Education' over the years formed a collaboration network which was analysed and presented in Figure 23. The visual in question is a "Countries-Collaboration Network" map that was published in the Computers & Education magazine. This map is used to visualize country-based scientific collaborations. The map illustrates the intensity and structural relationships of international collaborations based on the publications featured in the journal. The United States, China, and the United Kingdom are at the core of the network and are represented by the largest nodes, indicating that these countries have both high publication productivity and extensive international collaborations. The robust connection between the United States and China signifies a substantial research collaboration between these two nations. Conversely, the United Kingdom has cultivated diplomatic relations with numerous nations by serving as a conduit between Europe, Asia, and the Americas. The color clusters on the network are indicative of geographical and thematic affinities. The red cluster corresponds to Central and Western European countries, the blue cluster corresponds to various countries clustered around the United Kingdom, and the green cluster corresponds to collaborations centered in Asia-Pacific and North America. Some countries (e.g., Russia, Slovenia, and the United Arab Emirates) are located in more peripheral positions and have a more limited number of collaborations. This structure underscores the fact that the studies published in the Computers & Education journal are firmly embedded in global collaborations and that interdisciplinary research is geographically diverse.

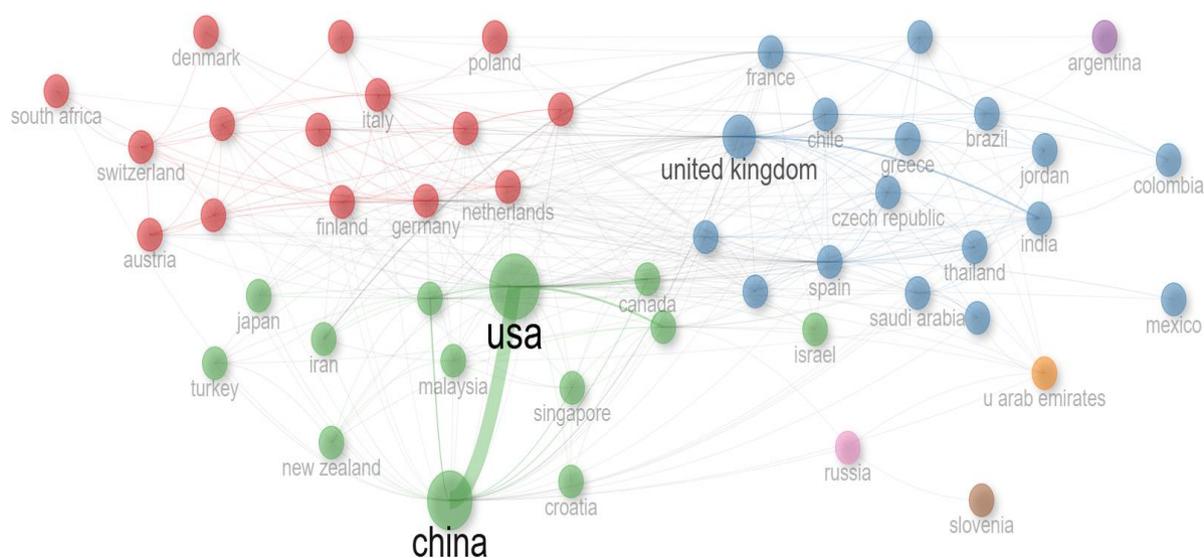


Figure 23. Countries-collaboration network

An analysis was conducted on the "Countries' Collaboration World Map", which was created by the countries publishing in the "Computers & Education" magazine over the years (Figure 24). This visual depiction illustrates the degree of collaboration among nations in the academic publication domain as evidenced by their contributions to the journal *Computers & Education*. It further elucidates the intricate scientific collaboration structures prevalent among these nations. The size of the nodes (countries) represents the total number of publications contributed by that country, while the thickness of the lines between the nodes indicates the number of joint publications between two countries. The colors represent geographical and regional clusters. The most prominent country in the network is the United States (USA). The United States is the most dominant and central actor in the network, a position that is attributable to two factors: its substantial publication output and its extensive network of connections with other countries. Notably, the robust connection between the two countries is evidenced by the publication of numerous joint publications in the domain of educational technologies and the establishment of substantial research collaborations. The presence of these connections with Asia-Pacific countries, including Malaysia, Singapore, and Canada, also fosters regional collaboration trends.

The United Kingdom is positioned as the second center in the network and has established a broad cooperation network with countries such as France, Spain, the Netherlands, Greece, the Czech Republic, and Italy, particularly in Europe. This phenomenon is indicative of the efficacy of interdisciplinary and transnational publication culture in Europe. Western European countries such as Germany, Italy, Finland, Switzerland, and the Netherlands have established close connections with each other in the red cluster, thereby sustaining regional academic synergy. Conversely, the blue group—comprising countries such as Brazil, Mexico, India, Jordan, the Czech Republic, Greece, and Thailand—illustrates the involvement of developing countries in the global research network and their engagement in multifaceted collaborations.

It has been demonstrated that countries occupying more peripheral positions, such as Argentina, Colombia, Russia, the United Arab Emirates (UAE), and Slovenia, are located in less connected regions of the network.

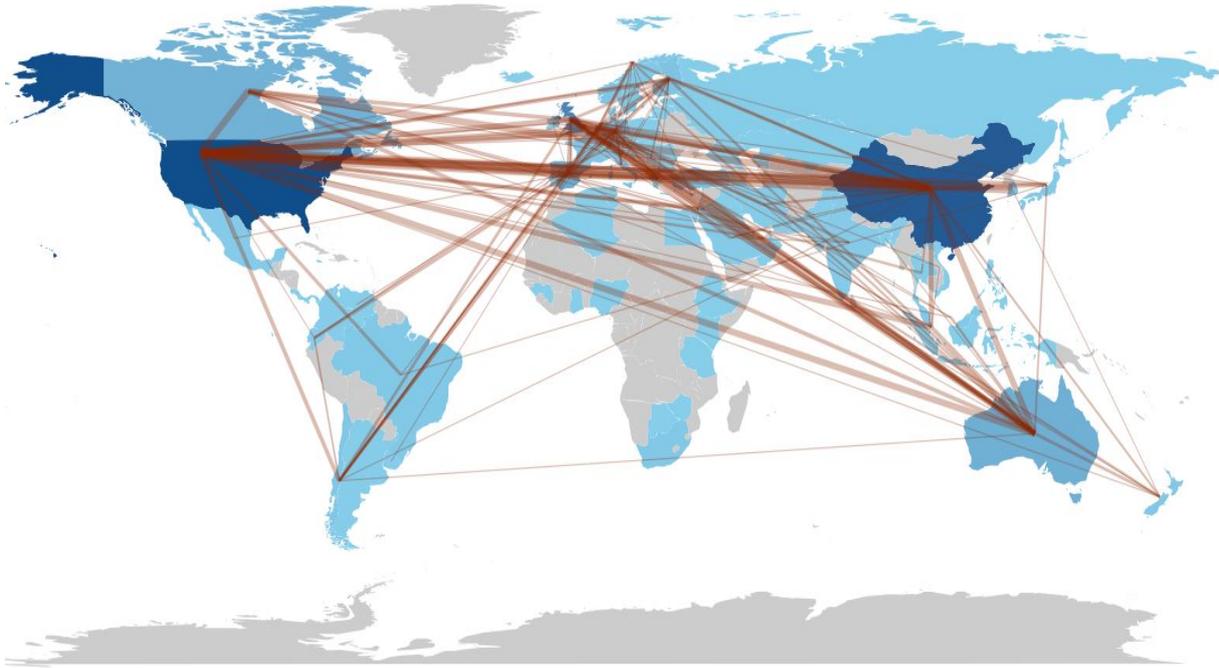


Figure 24. Countries' collaboration world map

These countries have demonstrated limited or more isolated research contributions. This geographical collaboration network demonstrates that the *Computers & Education* journal has a broad academic coverage at the global level, revealing that countries such as the United States, China, and the United Kingdom play a central role in knowledge production. The network's multi-centered and densely interconnected structure indicates that interdisciplinary, intercultural, and intercontinental collaborations in educational technology are increasingly strengthening. This finding lends substantial support to the notion that education in the digital age has evolved into a global scientific concern, transcending its traditional local and national boundaries.

Conclusion and Discussion

The present study analysed 4,715 articles published in the journal *Computers & Education* between 1978 and 2025 using bibliometric methods to reveal the journal's structural, thematic and collaborative orientations. In the context of the study's primary objective of 'identifying the most influential authors, institutions, and countries,' Hwang Gwo-Jen, National Taiwan Normal University, and China emerged as the leading producers and interaction centres. These findings are consistent with the rise of East Asia-centred digital education research highlighted in previous studies (Chen et al., 2021; Pranckutė, 2021).

Secondly, an analysis of citation intensity and trends revealed a significant increase in the number of annual publications and citations, particularly after 2008. This phenomenon can be attributed to the increasing use of technological developments in educational environments and the growing academic interest in digital pedagogies (Donthu et al., 2021; Lee et al., 2020).

In the context of the third objective, which sought to ascertain 'keywords and current research themes,' keyword co-occurrence analysis revealed that the extant studies were grouped under three overarching themes: student achievement and performance, technology-supported learning and motivation, and user acceptance and self-efficacy. This finding is consistent with the studies by Papastergiou (2009) and Sung et al. (2016), which emphasise the impact of technology-based learning on student motivation.

Fourthly, an examination of 'clusters formed according to author matches' revealed that studies centred on learning outcomes were grouped in pedagogically-based clusters, while concepts such as user perception and technology acceptance were grouped in more system-centred clusters. This multi-layered structure demonstrates that the literature focuses on both pedagogical and psychological dimensions (Bandura, 1997; Venkatesh, 2003).

Finally, an analysis of international collaboration networks revealed that certain countries, notably the United States, China, and the United Kingdom, occupied a pivotal role. It was further observed that Asia-Pacific countries, specifically, exhibited an escalating commitment to international publishing activities. This finding is consistent with the observations made by Arici et al. (2019) and Song et al. (2019) regarding the shift of global knowledge production centres in the field of educational technologies towards the East.

This comprehensive analysis demonstrates that the journal *Computers & Education* offers a holistic perspective that encompasses not only technology use but also pedagogical approaches, user behaviour, and digital transformation processes. The data obtained offer three key recommendations for future research:

The present study is an example of inclusive and multidisciplinary research. Addressing the pedagogical, cognitive, and systemic dimensions in unison will serve to enrich the extant literature.

The provision of support for regions that are underrepresented. It is recommended that academic collaborations be encouraged with a view to increasing the representation of regions such as Latin America, the Middle East and Africa.

The integration of novel technologies is a subject that has been the focus of much recent discussion. As posited by Wu et al. (2013) and Ertmer (2012), experimental studies on the integration of emerging technologies, such as artificial intelligence and augmented reality, into education, should be increased.

The present study provides a robust foundation for future research directions by mapping the current state of the field at the macro level.

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Due to the scope and method of the study, ethics committee permission was not required.

Author Contribution Statement

Aydm BULUT: *Conceptualisation; literature review and selection; critical analysis and synthesis of sources; draft preparation, revision and final approval of the article.*

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