Two Decade of Scholarly Landscape: A Bibliometric Exploration of Digital Humanities in Education Research

Ina Suryani[*1], Wan Azani Mustafa[*2], Noorli Khamis[*3], Warsidi Warsidi[*4], Faharol Zubir[*1]

[1]Faculty of Business and Communication, Centre of Excellence for Unmanned Aerial Vehicle, University Malaysia Perlis, Malaysia

[2]Faculty of Electrical Engineering Technology, Universiti Malaysia Perlis, Malaysia

[3]Pusat Pembelajaran Bahasa, Universiti Teknikal Malaysia Melaka (UTeM), Malaysia

[4]Universitas Islam Makassar

[*]Corresponding Author

DOI: https://dx.doi.org/10.47772/IJRISS.2025.903SEDU0017

Received: 29 December 2024; Accepted: 06 January 2025; Published: 06 February 2025

ABSTRACT

The study explores the integration of digital humanities in education research, focusing on the application of digital tools and methodologies to enhance educational research and practice. Given the rapid advancement of technology in academia, Digital Humanities (DH) plays a significant role in fostering interdisciplinary studies, especially in language and humanities education. Despite its potential, research on DH in education lacks comprehensive bibliometric analysis, which this study addresses using Scopus Analyzer and VOSviewer software. A dataset of 603 publications was gathered, analyzed for trends, prolific authors, and collaborative networks. Results indicate an exponential growth in DH publications, especially post-2018, with significant contributions from the United States, United Kingdom, and Germany. Keyword analysis reveals central themes around "artificial intelligence," "digital literacy," and "higher education," suggesting that DH in education emphasizes the role of technology in developing skills and collaborative learning. Analysis of co-authorship trends reveals strong international partnerships, with the U.S. and U.K. leading in both publication volume and collaborative strength, while emerging contributions from Asia and Oceania reflect a growing global interest. This study concludes that DH in education is a rapidly evolving field, marked by concentrated expertise in certain regions alongside expanding international engagement. The findings provide a foundational understanding of current research dynamics and highlight opportunities for future collaborations in digital humanities education.

Keywords: Digital humanities, Education

INTRODUCTION

The integration of digital humanities into language education represents a transformative approach that leverages advanced digital technologies to enhance the teaching and learning of languages. Digital humanities platforms serve as crucial infrastructures that support this integration by providing innovative tools and resources for language educators and learners. These platforms facilitate the development of language skills through interactive and engaging digital environments, which can include intelligent learning systems, digital competitions, and collaborative project [1] [2][3].

The use of digital tools in language education not only modernizes traditional teaching methods but also aligns with the rapid digitalization and globalization of society, making language learning more accessible and effective[4], [5]. Moreover, digital technologies play a pivotal role in fostering collaborative creativity in language education. By enabling communication, collaboration, and dialogical interaction, these technologies

create rich, resourceful environments that stimulate collective creative processes among students[6]–[8]. The implementation of digital humanities in language education also involves the use of intelligent learning systems that adapt to the needs of learners, enhancing their motivation and effectiveness in mastering language skills [1], [9], [10]. As the digital revolution continues to reshape the educational landscape, the integration of digital humanities into language education offers promising opportunities for developing key competences and preparing students for the complexities of a globalized world [11][12].

LITERATURE REVIEW

Digital Humanities (DH) has increasingly merged digital tools with humanities to enhance student engagement and educational methodologies. Research indicates a rising interest in DH for addressing modern educational challenges through technology-driven learning approaches. For instance, Chen et al.[13] illustrate DH's role in knowledge sharing across institutions in China, Japan, and the U.S., showcasing its value for international knowledge dissemination. Similarly, Bekiari and Xesternou [14] demonstrate how DH tools foster critical thinking and collaborative learning, such as in ancient Greek studies, while Piper and Roscoe[15] highlight DH's potential for interactive public learning, particularly in historical contexts. Together, these studies underscore DH's contribution to fostering an informed, interactive, and critically engaged learning environment.

DH initiatives also bring methodological innovations but present challenges in balancing digital skills with traditional humanities objectives. Iliev (2020) shows how DH in Classics at the University of Sofia deepens student interaction with primary sources, while Schmitz et al.[16] emphasize that digital literacy in Swiss schools is influenced by teachers' skills and limited by infrastructure. Dianova and Schultz [17] advocate for transdisciplinary digital literacy, particularly in response to the growing presence of AI. These studies suggest that although DH can enhance educational experiences, it requires thoughtful integration to ensure that digital skills complement, rather than overshadow, humanities disciplines. Moreover, DH reveals gaps in educational research, especially in defining digital competency standards. Zhang et al. [18] identify inconsistencies in DH job skills, highlighting the need for standardized competencies. See et al.[19] propose simulation models that could inform DH curricula, and Block [20] emphasizes DH's potential in collaborative learning within colonial history. These studies indicate a need for structured frameworks to teach relevant digital skills across disciplines.

Despite its promise, DH faces structural and ethical challenges. Schmitz et al. [16] point out that infrastructure disparities can hinder DH accessibility, potentially creating inequities. Piper and Roscoe [15] caution against biases in digital crime history projects, underscoring the need for critical approaches in public pedagogy. Hiippala[21] discusses how digital tools impact science diagram genres, influencing educational presentations and understanding. These findings underscore the importance of ethical considerations to ensure DH supports equitable and inclusive educational outcomes.

Additionally, DH applications in education extend to fields like gamification and digital illustration. Manu and Gala[22] examine gamification in libraries, noting its role in promoting digital literacy and user engagement. Although effective, this study suggests that more robust methodologies are needed to assess the impact on learning outcomes [22], [23], [24], . Munster et al. [23], [24] emphasize digital literacy in heritage studies, identifying a need for scalable models to bridge varying skill levels. Kellner et al. [20] find that digital drawing enhances medical students' communication skills, yet, as with much DH research, these studies' narrow focus calls for cross-disciplinary investigations [23], [25], [26]. Bekele et al. [26]discuss DH's role in African medical education, advocating for critical thinking and awareness of social systems in healthcare, despite institutional barriers. Casarosa et al. [24] underscore DH's interdisciplinarity by showcasing its integration with data science at the University of Pisa, though rigid structures sometimes limit its impact. These examples suggest a need for adaptable educational frameworks to leverage DH as a versatile, cross-disciplinary tool for modern education [27].

In summary, existing research highlights DH's transformative potential in advancing pedagogical practices but also points to areas needing further exploration, including standardized competencies, equitable access, and critical engagement with digital methods. To fully establish DH's role in education, future studies should focus on inclusive, scalable models that address varied technological skills and ethical considerations, thus ensuring DH's meaningful impact across educational contexts.

Research Question

- Research Question 1. What are the research trends in online learning studies according to the year of publication?
- Research question Two: What are the most cited articles? Who writes the most cited articles?
- Research question three: What are the type of document by subject of research?
- Research question Four What are the popular keywords related to the study?
- Research question Five: What are co-authorship countries' collaboration?

METHODOLOGY

Bibliometrics means the combination, managing and investigation of bibliographic information obtained from publications which are scientific in nature [28]–[30]. Along with general descriptive statistics, such as, publishing journals, publication year and main author classification [31]; it also comprises complex techniques, such as, document co-citation analysis. A successful literature review necessitates an iterative process involving the identification of appropriate keywords, literature search, and thorough analysis to build a comprehensive bibliography and yield dependable results [32]. In light of this, the study sought to focus on top-tier publications, as they offer valuable insights into the theoretical perspectives shaping the evolution of the research domain. To ensure data reliability, the study relied on the SCOPUS database for data collection [33]–[35]. Moreover, in order to ensure the inclusion of high-quality publications, only articles published in rigorously peer-reviewed academic journals were considered, with a deliberate exclusion of books and lecture notes [36]. Notably, Elsevier's Scopus, known for its extensive coverage, facilitated the collection of publications spanning from 2020 to December 2023 for subsequent analysis.

Data search strategy

Study employed a screening sequence to determine the search terms for article retrieval. The two tables provide details of the search strategy used in Scopus for the study titled *"A Bibliometric Exploration of Digital Humanities in Education."* Table 1 shows the advanced search string applied in Scopus, which specifies that results should contain the terms *digital*, *humanities*, and *education* in the title, abstract, or keywords (TITLE-ABS-KEY), ensuring relevance to digital humanities in educational contexts. The search is limited to English-language publications from 2004 to 2024, thus focusing on recent literature while excluding non-English and pre-2004 documents.

Table 1: The search string.

Scopus	TITLE-ABS-KEY ((digital AND humanities) AND (education)) AND PUBYEAR > 2003 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English"))

Table 2: The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	2004 – 2024	< 2004

Table 2 summarizes the inclusion and exclusion criteria: only English-language documents are included, with non-English publications excluded, and the timeline for the study is set to capture publications from 2004 to 2024, excluding those published before 2004. These criteria help refine the dataset for a focused bibliometric

analysis.

Data analysis

VOSviewer is a highly accessible tool for bibliometric analysis, created by Nees Jan van Eck and Ludo Waltman at Leiden University, , Netherlands [37], [38]. Researchers widely use it for visualizing and analyzing academic literature, as it excels at creating network visualizations, clustering related items, and producing density maps. VOSviewer's flexibility enables users to examine networks of co-authorship, co-citation, and keyword co-occurrence, giving a well-rounded view of research landscapes. With its interactive interface and regular updates, the tool makes exploring large datasets straightforward and dynamic. Additionally, its features for computing metrics, customizing visualizations, and supporting various bibliometric data sources make it an invaluable resource for researchers seeking to uncover insights in complex research areas. For this study, we gathered datasets in PlainText format from Scopus, including publication year, title, author, journal, citation, and keywords, covering 2004 through 2024. Using VOSviewer version 1.6.19, we applied clustering and mapping techniques to analyze and generate visual maps.

RESULT AND DISCUSSION

Research Question 1. What are the research trends in online learning studies according to the year of publication?

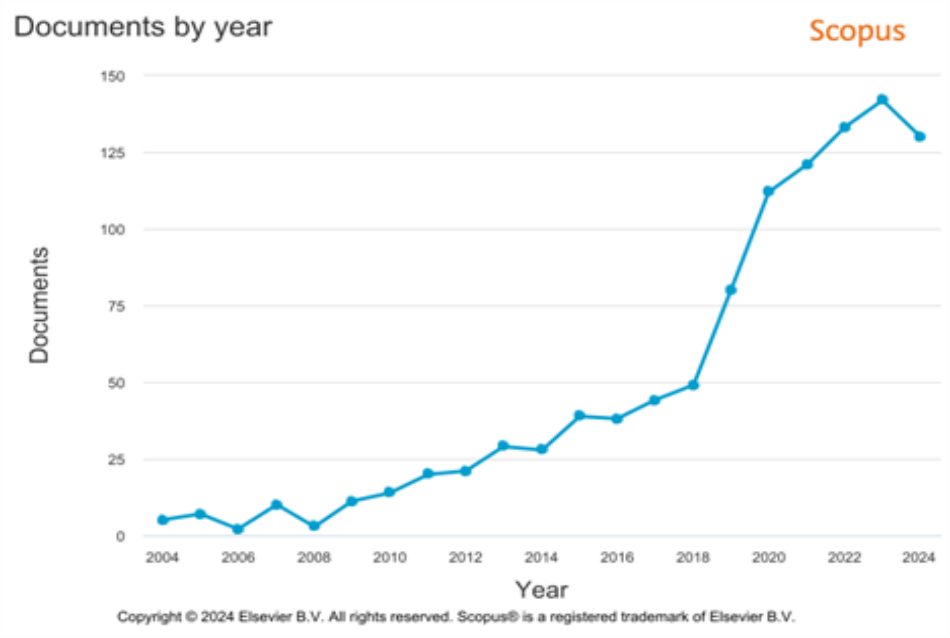
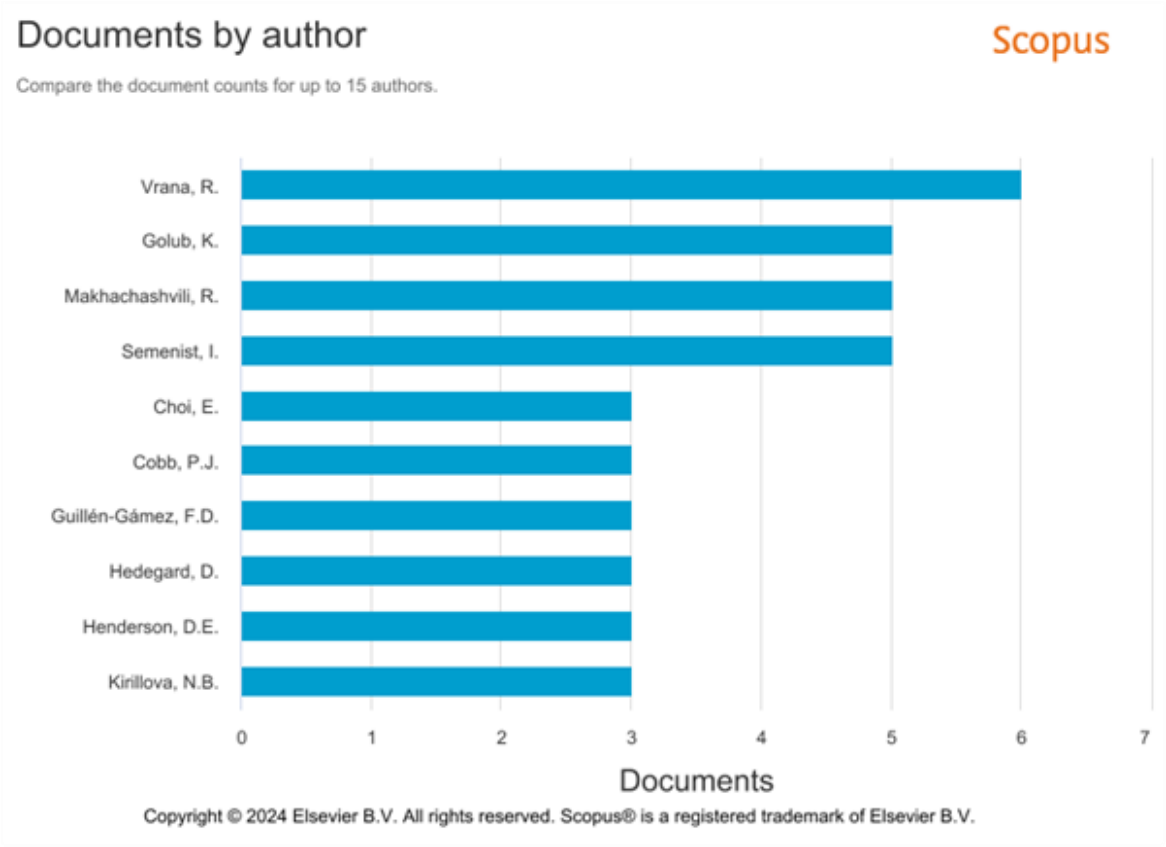


Figure 1: Plotting document publication by years.

The image shows a bibliometric analysis from Scopus depicting document publication trends over two decades (2004-2024). The graph reveals a striking exponential growth pattern, particularly in the last five years. Starting from a modest baseline of around 5-10 documents annually between 2004-2009, there was a gradual increase to about 20-40 documents per year during 2010-2018. However, the most remarkable surge occurred post-2018, with publications rising dramatically from approximately 50 documents to peak at nearly 140 documents around 2022-2023.

The data suggests three distinct phases in research activity: an initial phase (2004-2010) characterized by low but stable publication output, a development phase (2010-2018) showing steady linear growth, and an acceleration phase (2018-2024) marked by explosive growth. This recent surge might indicate increased research funding, growing academic interest, or the emergence of new research directions in the field. The slight decline observed in 2024 is likely incomplete data as the year is still ongoing. This overall trend strongly suggests that the research area has gained significant momentum and established itself as an important field of study within the academic community.

Research question Two: What are the most cited articles? Who writes the most cited articles?



Based on the Scopus data visualization, the top 10 most prolific authors in Digital Humanities in Education research reveal an interesting distribution of scholarly contributions. Vrana, R. emerges as the leading researcher with approximately 6 publications, followed by three authors - Golub, K., Makhachashvili, R., and Semenist, I. - each with about 5 publications. The remaining authors, including Choi, E., Cobb, P.J., Guillén-Gámez, F.D., Hedegard, D., Henderson, D.E., and Kirillova, N.B., have contributed roughly 3 publications each. This relatively even distribution of publications among the top authors, with only a small gap between the highest and lowest contributors, suggests a well-distributed research community without dominant monopolies. The close clustering of publication counts also indicates collaborative and competitive dynamics in the field of Digital Humanities in Education, with multiple scholars making substantial contributions to the body of knowledge.

Table 3:

AUTHOR NAME	NUMBER OF ARTICLES	PERCENTAGE
Vrana, R.	6	0.578
Golub, K.	5	0.482
Makhachashvili, R.	5	0.482
Semenist, I.	5	0.482
Choi, E.	3	0.289
Cobb, P.J.	3	0.289
Guillén-Gámez, F.D.	3	0.289
Hedegard, D.	3	0.289

Henderson, D.E.	3	0.289
Kirillova, N.B.	3	0.289

The table presents the results of a bibliometric analysis on Scopus for the paper titled "Bibliometric Exploration of Digital Humanities in Education." These findings highlight the leading contributors in the field.Vrana, R. leads with six articles, representing 0.578% of the total publications, setting them apart as a primary contributor in the field. They are followed by Golub, K., Makhachashvili, R., and Semenist, I., each contributing five articles (0.482%). Other authors, including Choi, E., Cobb, P.J., Guillén-Gámez, F.D., Hedegard, D., Henderson, D.E., and Kirillova, N.B., each published three articles, contributing 0.289% respectively. Though each of these authors contributed fewer articles than Vrana, Golub, Makhachashvili, and Semenist, their work collectively demonstrates the diverse range of perspectives in Digital Humanities in Education. This distribution of contributions highlights a collaborative research landscape with multiple active contributors pushing forward this interdisciplinary field.

Table 4

Authors	Title	Year	Source title	Cited by
Bond M.; Buntins K.; Bedenlier S.; Zawacki-Richter O.; Kerres M. [39]	Mapping research in student engagement and educational technology in higher education: a systematic evidence map	2020	International Journal of Educational Technology in Higher Education	392
Kong S.C.[40]	Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy	2014	Computers and Education	321
Zhang X.; Chen Y.; Hu L.; Wang Y.[41]	The metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics	2022	Frontiers in Psychology	224
Nowak K.L.; Fox J.[42]	Avatars and computer-mediated communication: A review of the definitions, uses, and effects of digital representations	2018	Review of Communication Research	200
Lupton D.[43]	Digital Sociology	2014	Digital Sociology	189
Han E.-R.; Yeo S.; Kim M.-J.; Lee Y.-H.; Park K.-H.; Roh H.[44]	Medical education trends for future physicians in the era of advanced technology and artificial intelligence: An integrative review	2019	BMC Medical Education	152
Wu J.; Chen D.-T.V.[45]	A systematic review of educational digital storytelling	2020	Computers and Education	140
Shin M.; Hickey K.[46]	Needs a little TLC: examining college students' emergency remote teaching and learning experiences during COVID-19	2021	Journal of Further and Higher Education	131

Sharma D.; Bhaskar S.[47]	Addressing the Covid-19 Burden on Medical Education and Training: The Role of Telemedicine and Tele-Education During and Beyond the Pandemic	2020	Frontiers in Public Health	118
Mercader C.; Gairín J.[48]	University teachers' perception of barriers to the use of digital technologies: the importance of the academic discipline	2020	International Journal of Educational Technology in Higher Education	118

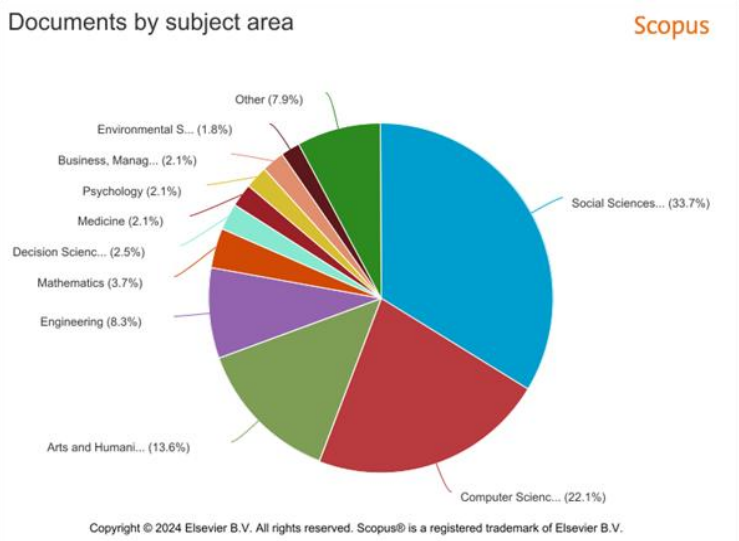
The table presents a selection of influential studies within the field of Digital Humanities in Education, revealing prominent research themes, publication years, and citation impact as recorded on Scopus. Bond et al.'s 2020 article, “Mapping research in student engagement and educational technology in higher education,” published in the *International Journal of Educational Technology in Higher Education*, is the most cited in this collection, with 392 citations. This high citation count indicates its significant impact on advancing research in student engagement and educational technology, a core area within Digital Humanities in education. Similarly, Kong's 2014 work on critical thinking and information literacy in digital classrooms, published in *Computers and Education*, has also been influential, gathering 321 citations and highlighting the importance of digital tools in developing foundational academic skills.

The table also reflects recent developments in the field, such as Zhang et al.'s 2022 article on the "metaverse in education," published in *Frontiers in Psychology*, with 224 citations. This article emphasizes emerging technology's transformative potential in education, addressing both the possibilities and challenges of integrating virtual environments. Other key articles include Nowak and Fox's 2018 review of avatars in digital communication, published in the *Review of Communication Research* with 200 citations, which underscores the significance of digital representations in learning environments. These articles highlight an ongoing research interest in both the conceptual and practical implications of digital tools and virtual environments in education.

Further entries focus on specialized applications of Digital Humanities in professional fields. For example, Han et al.'s 2019 integrative review on technology and AI in medical education, published in *BMC Medical Education* (152 citations), underscores the role of DH tools in preparing future physicians. Similarly, studies like Mercader and Gairín’s 2020 analysis on the barriers to digital technology in higher education (*International Journal of Educational Technology in Higher Education*, 118 citations) identify challenges faculty face, emphasizing the need for field-specific technological integration strategies. Collectively, these studies illustrate Digital Humanities' broad impact across different disciplines, from medical education to sociology, and reveal significant research focus areas and challenges in digital integration within educational contexts.

Research question three: What are the type of document by subject of research?

Figure 4:



The subject area distribution in Digital Humanities in Education research demonstrates a diverse but clearly hierarchical pattern of disciplinary engagement. Social Sciences dominates the field with 33.7% of publications, followed by Computer Science at 22.1%, reflecting the interdisciplinary nature of digital humanities in educational contexts. Arts and Humanities contributes significantly at 13.6%, which is expected given the field's focus. Engineering represents 8.3% of publications, while Mathematics accounts for 3.7%. There's a consistent representation of various other disciplines including Decision Sciences (2.5%), and equal contributions (2.1% each) from Medicine, Psychology, and Business Management. Environmental Sciences holds 1.8% of the publications, while other miscellaneous fields collectively contribute 7.9%. This distribution highlights the interdisciplinary nature of digital humanities in education, with a strong emphasis on social sciences and technological aspects while incorporating perspectives from multiple academic domains.

Research question Four What are the popular keywords related to the study?

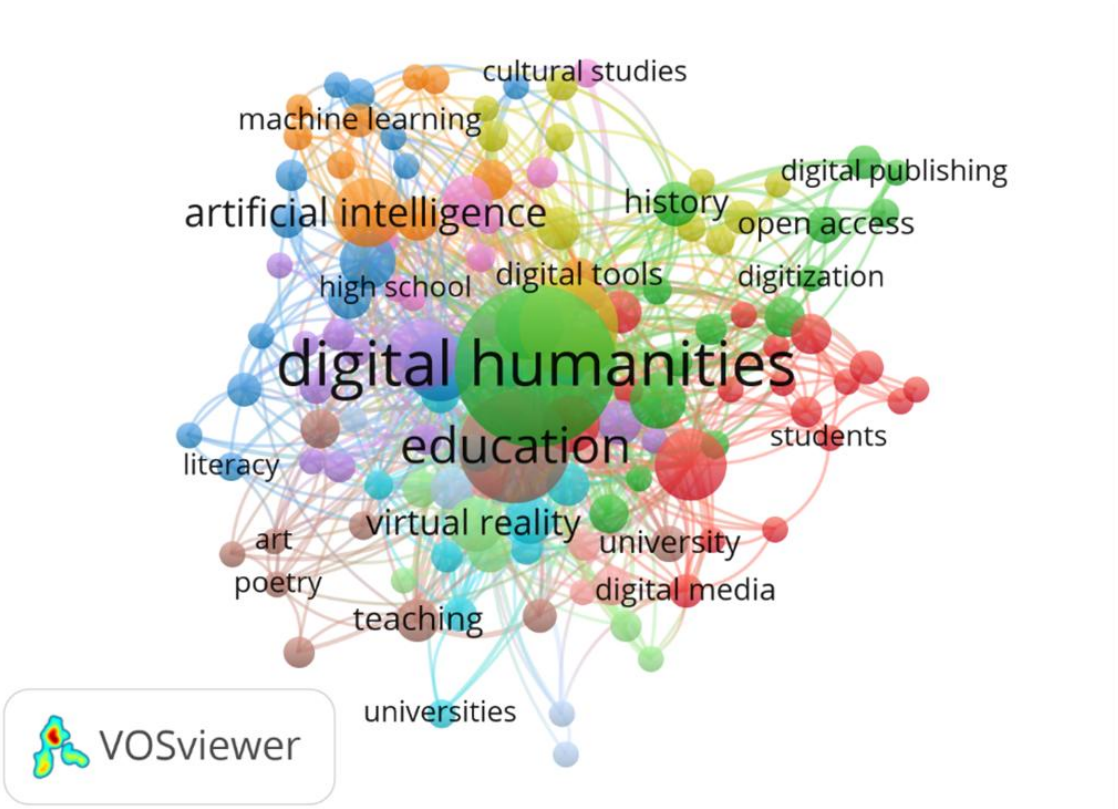


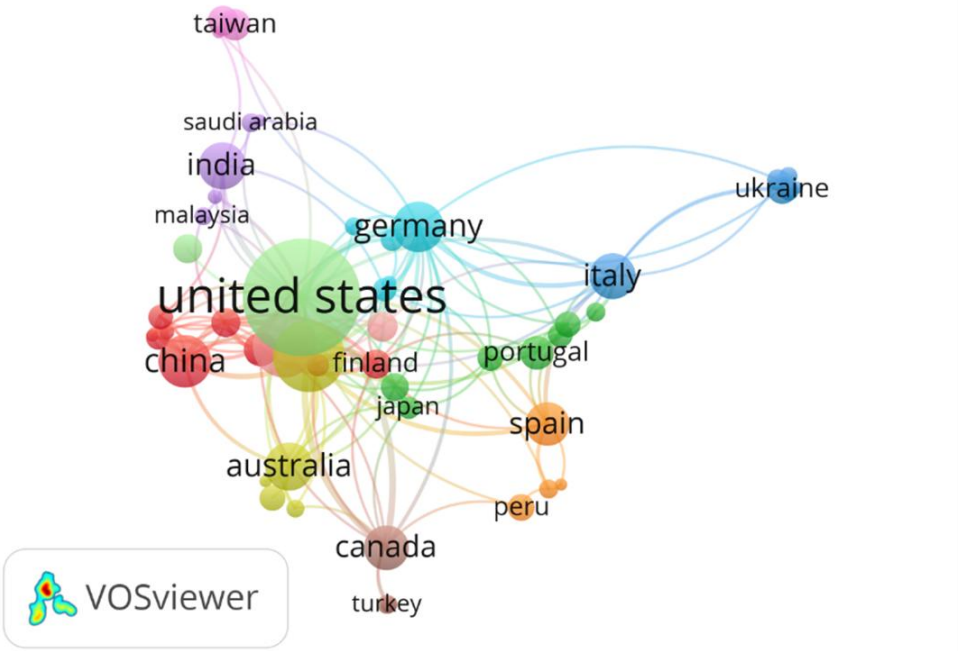
Figure 2: Network visualization map of keywords' co-occurrence

The keyword analysis in the field of Digital Humanities in Education reveals a strong focus on emerging technologies and their impact on learning environments. Keywords like "artificial intelligence" (29 occurrences, total link strength 47) and "digital literacy" (31 occurrences, total link strength 49) stand out as prominent areas of interest, reflecting the growing importance of technology-driven skills in education. "Digital humanities" itself, with the highest occurrences (154) and total link strength (189), clearly dominates the discourse, underscoring its relevance as a central theme in recent research. High link strengths associated with these keywords indicate active scholarly interaction and collaboration around these topics, suggesting that they are crucial components of the Digital Humanities education landscape.

Another significant theme evident in the data is the intersection between digital tools and pedagogy. Keywords such as "digital technologies" (20 occurrences, total link strength 40), "pedagogy" (29 occurrences, total link strength 54), and "virtual reality" (18 occurrences, total link strength 41) reflect an ongoing exploration of how digital tools can enhance teaching practices. The prominence of "higher education" (59 occurrences, total link strength 91) points to a focus on applying these innovations within university settings. Other terms like "blended learning" and "augmented reality" further emphasize an interest in combining digital and traditional methods to create dynamic, interactive learning experiences. These keywords highlight the emphasis on adaptable, tech-enhanced pedagogy, aimed at engaging students and fostering deeper learning.

Finally, topics related to cultural and social contexts in digital education are also prevalent. Keywords like "cultural heritage" (9 occurrences, total link strength 24), "sustainability" (4 occurrences, total link strength 7), and "ethics" (15 occurrences, total link strength 25) indicate an awareness of the broader implications of digital education. Terms such as "collaboration" (19 occurrences, total link strength 36) and "social media" (10 occurrences, total link strength 13) suggest that researchers are examining how digital platforms can foster collaborative and socially relevant learning experiences. Overall, these keywords reflect a holistic approach, where technology in education is not only about tools but also about aligning with cultural values, ethical considerations, and sustainable practices, which are essential for a balanced and inclusive educational framework.

Research question Five: What are co-authorship countries' collaboration?



The data from VOSviewer software reveals notable trends in the publication and citation landscape related to Digital Humanities in Education across various countries. The United States leads significantly with 247 documents, 1,705 citations, and a total link strength of 59, underscoring its dominant role in research output and influence in this field. The high citation count and link strength reflect the centrality of the U.S. in collaborative networks and the global research discourse. Similarly, the United Kingdom follows with 91 documents, 830 citations, and a total link strength of 47, highlighting its substantial contribution to research in Digital Humanities, albeit on a smaller scale than the U.S. Both countries' extensive collaboration networks indicate strong international engagement, which likely drives their high citation impact.

Germany, with 46 documents, 639 citations, and a total link strength of 33, ranks prominently among European countries, suggesting its strong research presence and influence in the field. Germany's robust citation count points to the high quality and relevance of its publications. Other European nations, including Spain and Sweden, have fewer documents (35 and 20, respectively) but maintain strong total link strengths (14 and 20), indicating active collaboration within the academic community. These countries seem to focus on collaborative efforts and impactful publications, even with relatively lower publication volumes.

Several countries outside North America and Europe also show emerging contributions to the Digital Humanities in Education, though with varying levels of impact. For instance, Australia has a relatively high number of documents (41) and citations (601) with a link strength of 15, reflecting growing regional interest and influence in the field. China also displays substantial research activity with 50 documents, 362 citations, and a link strength of 18, underscoring its expanding role in global research. Countries such as Canada and India have a sizable number of publications (37 and 40 documents, respectively) but exhibit varying citation counts and link strengths, suggesting different levels of integration and influence within the broader research network.

Countries with fewer documents and lower total link strengths, such as Bulgaria, Malaysia, and South Africa, demonstrate emerging interest but limited influence and collaboration in the field. These countries might benefit from increased international collaboration to strengthen their research impact. Similarly, while countries like New Zealand and Singapore have relatively few publications (6 documents each), they exhibit high citation counts (162 and 159, respectively), which suggests that their contributions, though fewer in number, are highly valued and widely cited. Overall, the data reflect a diverse and globally distributed research landscape, where countries differ in research volume, impact, and collaborative strength within the field of Digital Humanities in Education.

The data reveals limited attention to Digital Humanities (DH) research contributions from regions like Africa and South America, which indicates a noteworthy discrepancy in global scholarly engagement. Countries in these regions often face challenges such as unequal access to digital resources, limited funding, and infrastructural constraints [49]. These limitations hinder their ability to participate in DH research networks. While nations like the U.S. and U.K. benefit from robust collaborative frameworks and technological advancements, African and South American researchers often lack similar opportunities to engage in high-impact, interdisciplinary studies. This inequality restricts the global inclusivity of DH research from these regions. Initiatives such as international collaborations, and open-access digital platforms can help these regions to access to DH tools and methodologies. Moreover, incentives and opportunities for region-specific DH studies could amplify the voices of underrepresented researchers. Bridging these gaps is crucial to ensuring a more equitable and comprehensive understanding of DH in education, ultimately enhancing its relevance and global impact.

Practical and Theoretical Implications

The findings highlight the need for integrating digital humanities (DH) tools into educational curricula to enhance students' digital literacy and interdisciplinary collaboration skills. Incorporating AI-driven tools and digital platforms enable active learning and promote sustainable, scalable practices in higher education [50]. Additionally, fostering international partnerships can amplify access to expertise and resources [51], allowing educators and researchers to co-develop globally relevant methodologies tailored to regional educational needs.

This study contributes to the theoretical framework of DH by emphasizing its role in transforming education into an interdisciplinary and collaborative domain. The analysis of thematic trends suggests that DH nurtures the merging of humanities and technology, redefining pedagogical models through innovative digital practices. Furthermore, the identification of regional inequalities such as from Africa and south America and emerging research hubs provides a basis for exploring the cultural dynamics that shapes the global adoption of DH in education.

CONCLUSION

The analysis of trends and collaboration in Digital Humanities within education suggests a globally diverse yet interconnected research landscape, with contributions from developed regions such as North America and Europe, and emerging research activities in Asia and Oceania. The United States and the United Kingdom lead in terms of research output, citations, and collaborative networks, indicating their central roles in driving discourse and innovation. European countries like Germany, Spain, and Sweden, although producing fewer documents, exhibit strong collaborative linkages, suggesting high-impact research within a closely knit academic community. Outside of these regions, countries like Australia and China are increasingly contributing to the field, reflecting a growing regional interest and an expanding influence in global research networks. Emerging contributions from countries with lower publication volumes and link strengths, such as Malaysia and South Africa, indicate budding engagement with potential for greater impact through international collaborations. African and South American researchers often lack similar opportunities that restricts their global inclusivity of DH research. International collaborations, and open-access digital platforms can help these regions to access to DH tools and methodologies as their contribution would give more comprehensive view on the global adoption of DH in education. Future digital humanities research could focus on using AI in education and studying the ethical use of technology in education. Other areas to explore include gamification learning and interactive tools

for public education.

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