JPPI (Jurnal Penelitian Pendidikan Indonesia)
Volume 11, Number 1 2025

Mapping educational innovation and knowledge dissemination: a global bibliometric study

Author Name(s): M. Fahli Zatrahadi, Yahya Muhammed Bah, Istiqomah Istiqomah, Saikou Gassama, Elrisfa Magistarina, Edris bin Aden, Kemo Juwara, Silas Oghenemaro Emovwodo, Haruna Badjie

Publication details, including author guidelines
URL: https://jurnal.iicet.org/index.php/jppi/about/submissions#authorGuidelines
Editor: Kushendar Kushendar

Article History
Received Jan 27th, 2025
Revised Mar 30th, 2025
Accepted Apr 07th, 2025

How to cite this article (APA)
Zatrahadi, M.F., Bah, Y.M.,Istiqomah, I., Gassama, S., Magistarina, E., Aden,E.B., Juwara, K., Emovwodo, S.O., & Badjie, H. (2025). Mapping educational innovation and knowledge dissemination: a global bibliometric study. Jurnal Penelitian Pendidikan Indonesia 11(1), 1-14. https://doi.org/10.29210/020255620

The readers can link to article via https://doi.org/10.29210/020255620

JPPI (Jurnal Penelitian Pendidikan Indonesia)
ISSN: 2502-8103 (Print) ISSN: 2477-8524 (Electronic)
Vol. 11, No. 1, 2025, pp. 1-14
DOI: https://doi.org/10.29210/020255620

Mapping educational innovation and knowledge dissemination: a global bibliometric study

M. Fahli Zatrahadi[1*)], Yahya Muhammed Bah[2], Istiqomah Istiqomah[1], Saikou Gassama[3], Elrisfa Magistarina[4], Edris bin Aden[5], Kemo Juwara[6], Silas Oghenemaro Emovwodo[7], Haruna Badjie[8]
[1] Universitas Islam Negeri Sultan Syarif Kasim Riau, Pekanbaru, Indonesia
[2] University of The Gambia, Banjul, The Gambia, West Africa, Gambia
[3] University of lebre Brussels, Belgium
[4] University of Leeds, United Kingdom
[5] Faculty of Cognitive Sciences and Human Development, Universiti Malaysia Sarawak, Malaysia
[6] Amrita School for Sustainable Futures, Amrita Vishwa Vidyapeetham, Amritapuri Campus, Kerala, India
[7] Universiti Brunei Darussalam, Brunei Darusalam
[8] Hochschule Bonn- Rhein- Sieg University of Applied Sciences, Germany

Article Info

Article history:

Received Jan 27th, 2025
Revised Mar 30th, 2025
Accepted Apr 07th, 2025

Keyword:

Education Innovation,
Knowledge Distribution,
Bibliometric Analysis,
Social Media,
Knowledge Management,
Digital Connectivity

ABSTRACT

From 2023 to 2025, 1,034 publications were examined for academic knowledge diffusion and educational innovation. This bibliometric analysis uses VOSViewer for data recovery, pre-processing, network extraction, normalization, and visualization. Due to its importance in educational innovation, many research clusters focus on "information dissemination". The educational innovation ecosystem comprises higher education social media, knowledge management, and sustainability. This analysis also finds clusters linking educational innovation to knowledge management, psychology, health workers, and sustainability. In this study, digital technology, architecture, and organizational intelligence determine how digital connectivity increases educational creativity. Technology like short films helps students understand difficult concepts. Educational innovation research may focus on machine learning, social media, and information distribution, according to keywords and trends. This study suggests digital tools, data-driven initiatives, and inclusive knowledge exchange for educational innovation. These findings could inspire new learning and knowledge distribution initiatives by academics, legislators, and educators.

Corresponding Author:

M. Fahli Zatrahadi,
Universitas Islam Negeri Sultan Syarif Kasim Riau,
Email: m.fahliz@uin-suska.ac.id

Introduction

Education serves as a fundamental pillar for sustainable societal development. Innovation in education and the dissemination of knowledge are critical factors in enhancing learning quality and ensuring adaptability to evolving times (Chen et al., 2021; Mensah, 2019; Mian et al., 2020). Research on

educational innovation has witnessed significant growth over the past decade, reflecting a global focus on transforming educational systems (Barrenechea et al., 2023; Serdyukov, 2017; Wang et al., 2024). Bibliometric analysis of related publications offers valuable insights into research trends, international collaborations, and key focus areas within this field (Donthu et al., 2021; Gan et al., 2022; Janik et al., 2021).

Recent studies indicate that innovation in education has experienced significant growth over the past decade, particularly in countries with educational infrastructures that support research and technological implementation (Kuzmenko et al., 2023; Makda, 2025; Okoye et al., 2023; Prahani et al., 2022). The United States, Europe, and Asia dominate scientific publications in this field, reflecting their substantial contributions to the advancement of educational innovation (Bischoff et al., 2018; Nye, 2015; Sandoval Hamón et al., 2024). Nevertheless, a gap remains in the participation of developing countries, highlighting challenges in accessing research resources and engaging in global academic collaboration (Chen et al., 2021).

Beyond the increasing number of publications, bibliometric analysis reveals that research on educational innovation is fragmented across various subthemes, including technology integration in learning, inclusive education, and data-driven instructional models (Balasubramanian et al., 2025; Metni, 2022; Plueger, 2024). This fragmentation poses significant challenges for practical implementation, as it hinders interdisciplinary collaboration and limits the transferability of research findings across different educational settings. Without a cohesive framework that bridges these subthemes, the adoption of innovative educational practices in real-world contexts remains inconsistent (Amini et al., 2024; Balasubramanian et al., 2025; Isaeva et al., 2025; Naz & Murad, 2017; Plueger, 2024; Yetti, 2024). Addressing this issue requires more integrative research efforts that connect theoretical advancements with practical applications while fostering cross-disciplinary cooperation.

In the context of implementing educational innovation, previous studies have highlighted that the use of digital technology, artificial intelligence, and data-driven learning models has become a primary focus (Dai & Ke, 2022; Gao et al., 2021). However, challenges such as infrastructure readiness, resistance to change, and limited resources remain significant barriers to effective implementation across various countries (Hamlaoui, 2021; Singun, 2025). Moreover, policy gaps further exacerbate these challenges by creating misalignments between research initiatives and institutional regulations. While research on educational innovation has extensively explored pedagogical methodologies and technological advancements, less attention has been given to how policy frameworks influence the sustainability and scalability of these innovations (Miranda et al., 2021; Putri, 2024; Southworth et al., 2023). In many cases, promising educational innovations fail to achieve widespread adoption due to restrictive policies, inadequate funding mechanisms, or bureaucratic hurdles that slow down institutional change (Bellei & Muñoz, 2023; Lee & Fanguy, 2022; Stecuła & Wolniak, 2022).

Furthermore, the dissemination of knowledge in the field of education is increasingly shaped by the dynamics of global academic collaboration (De Wit & Altbach, 2021; Li, 2024). Bibliometric analysis reveals that strong research networks between higher education institutions and the industry sector play a crucial role in accelerating the adoption of educational innovation. However, the gap between theoretical research and its practical application remains a critical issue that must be addressed to ensure that innovations have a tangible impact (Amiel & Reeves, 2008; Liu et al., 2023; Sharma et al., 2022). This highlights the need for collaborative efforts involving policymakers, educators, and researchers to create a more conducive environment for the practical implementation of educational advancements.

Considering the various findings from previous studies, mapping the literature through bibliometric analysis can provide a more comprehensive understanding of how educational innovation evolves and how knowledge is distributed globally. By identifying gaps in interdisciplinary collaboration and policy frameworks, scholars and policymakers can formulate more targeted strategies to enhance the adoption and sustainability of educational innovations (Maral, 2024).

The exploration of educational innovation and knowledge dissemination through bibliometric analysis represents a strategic approach to comprehensively understanding the global research landscape. By utilizing data from the Scopus database, this study aims to contribute to the identification

of key trends, academic collaborations, and the challenges associated with advancing educational innovation in the future. This approach not only enables the identification of emerging research directions but also provides a foundation for integrating policy considerations into the broader discussion on educational transformation.

Method

Various terms are used to describe research that examines the literature on mapping educational innovation and knowledge dissemination, including systematic reviews, bibliometric analysis, scient metrics, and classical literature reviews. However, the application of bibliometric analysis remains limited, particularly in the context of mapping educational innovation and knowledge dissemination. This gap presents an opportunity to review previous studies that have employed bibliometric analysis in related research, thereby providing deeper insights into trends and developments in this field.

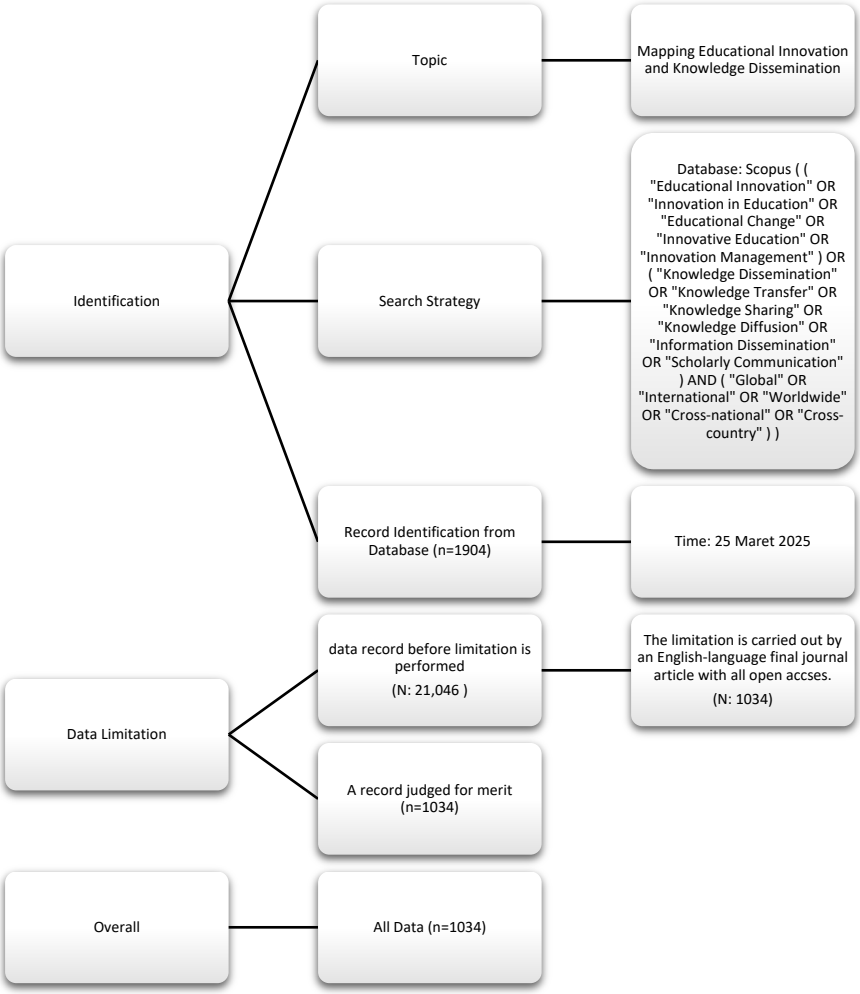

Figure 1. The search strategy is tailored according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) workflow (Page et al., 2021).

In bibliometric science analysis, the workflow consists of several key stages: data retrieval, preprocessing, network extraction, normalization, mapping analysis, and visualization (Noyons, 1999; Peters & Van Raan, 1993). The first stage begins with data retrieval, where preprocessing analysis is conducted based on statistics from Scopus on 1,034 publications collected between 2023 and 2025. At this stage, temporal trends in the number of journal articles most frequently referenced are analyzed.

Next, a network extraction analysis is conducted for scientific mapping and the visualization of relationships between bibliographic data. In the scientific mapping process, VOSviewer software is used to construct networks based on the available data (van Eck, 2010). Subsequently, relevance scores

are calculated to identify clusters related to the research domains of the analyzed publications (Waltman et al., 2010). In the final stage, a visualization map is generated based on the constructed network (Eck & Waltman, 2014).

Additionally, the analysis includes measuring author collaborations and identifying the most frequently used keywords with high correlations in research related to the mapping of educational innovation and knowledge dissemination. The following are the key stages of this study (Figure 1). This study consists of several key stages: Identification, Search Strategy, Data Constraints, and Overall Data.

Identification

The first stage begins with defining the research topic, focusing on educational innovation and knowledge dissemination. The search strategy is conducted using the Scopus database, employing keywords that encompass various related terms such as "Educational Innovation", "Innovation in Education", "Knowledge Dissemination", and "Scholarly Communication." Additionally, the study includes keywords related to global coverage, such as "International," "Worldwide," and "Cross-country."

Data Constraints and Screening

After conducting a search in the Scopus database on March 25, 2025, an initial set of 1,940 records was identified. Prior to applying constraints, the total number of identified records reached 21,046. To enhance research relevance, filters were applied, considering only English-language scholarly journals with global affiliations. As a result, the final dataset was refined to 1,034 records.

The selection of the 2023–2025 timeframe in this study is based on relevance to the latest trends in educational innovation. Innovations in this field are growing rapidly, especially after the COVID-19 pandemic, which encourages digital transformation in learning. This study can show big changes in education policies, methods, and technologies that still have an effect on current practice because it only looks at the last three years. Additionally, bibliometric studies try to find patterns in the academic publications and collaborations that happened over a certain time period. This means that shorter time periods allow for a more focused analysis of recent developments without being affected by methodological differences in longer publications.

Time range restrictions take into account both how relevant the data is and how efficiently it can be managed and analyzed. Since there are more and more scientific papers published every year, choosing a shorter time frame makes sure that the data is consistent and lowers the chance of bias caused by changes in research standards from year to year. In addition, this study aims to show what the next big ideas will be in educational innovation, so that looking at the newest data is a better way to figure out where future research progress should go. So, putting limits on the years 2023–2025 not only keeps things relevant in the classroom, but it also makes it easier to understand and find the patterns most affected by global educational innovation.

Overall Data

After undergoing the selection process and relevance assessment, the final number of documents included in the bibliometric analysis is 1,034 publications. This dataset is then utilized for mapping educational innovation and knowledge dissemination on a global scale.

Results and Discussions

At this stage, the results and discussion of the bibliometric study on Mapping Educational Innovation and Knowledge Dissemination focus on the analysis of publications, including the identification of authors with the highest number of publications, the most frequently occurring keywords, and the most relevant topics that remain a primary focus in this field.

By employing bibliometric techniques, this study reveals the key contributors who have significantly shaped the development of this research area and how keyword trends reflect the evolution of studies over time. Furthermore, the analysis of dominant topics enables the mapping of emerging themes, providing insights into aspects of educational innovation and knowledge dissemination that continue to be of central interest within the global academic community.

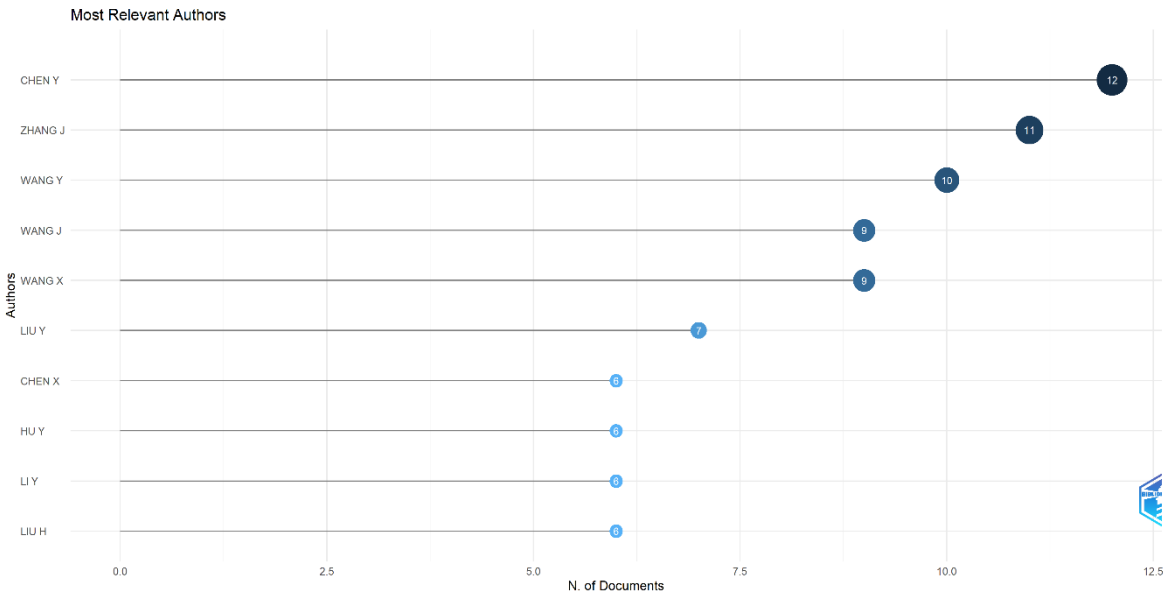

Figure 2. Most Relevant Authors

This graph presents a list of the most relevant authors based on the number of documents they have published. It was analysed using RStudio with the Bibliometrix package. The results indicate that Chen Y is the most prolific author, with a total of 12 publications, followed by Zhang J with 11 publications, as well as Wang Y (10 publications), Wang J (9 publications), and Wang X (9 publications), who have also made significant contributions in this field. Other authors, such as Liu Y (7 publications), Chen X, Hu Y, Li Y, and Liu H (each with 6 publications), also demonstrate active involvement in related research.

This visualisation shows that authors with larger bubbles and darker colours publish more. Authors with a high number of publications are likely to have expertise in a specific research area and can serve as key references for other scholars. Additionally, the recurrence of certain surnames in this list (such as Wang, Chen, and Liu) may indicate the presence of active research groups within specific domains. This analysis is useful for identifying the most productive authors in a discipline, helping other researchers find potential collaborators or key references for their studies.

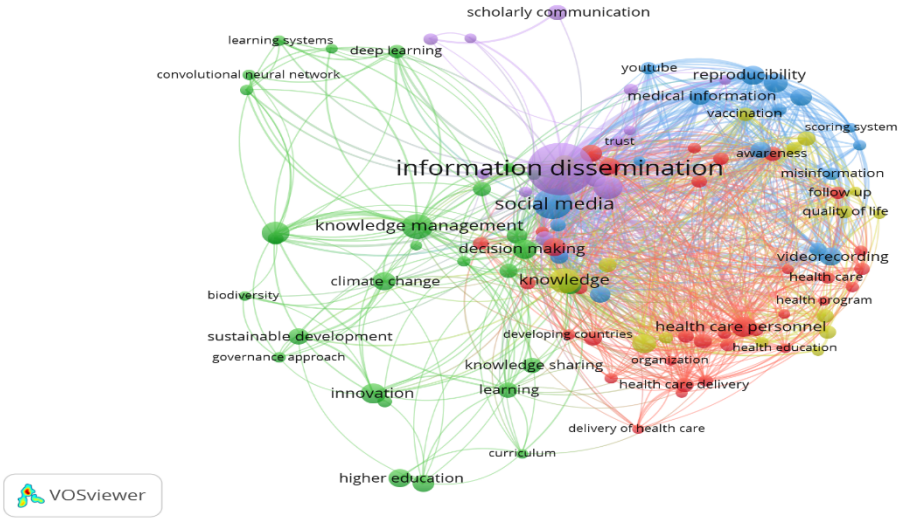

Figure 3. Keyword Network Visualisation

Currently, the visualisation map includes only keywords appearing at least 11 times in the dataset, with a selected threshold of 11. Out of a total of 8,156 keywords, 181 meet this threshold. Overall, this

figure represents one of the steps in bibliometric analysis using VOSviewer, aiming to map relationships between keywords in scientific literature based on their frequency of occurrence.

The visualization generated by VOSviewer presents a bibliometric mapping related to information dissemination and educational innovation. The nodes in this graph represent various terms frequently appearing in the relevant scientific literature, while the size of each node reflects the frequency of occurrence in publications. Different colors illustrate topic clustering, indicating closely related research themes. The visualization results reveal that the term "information dissemination" is positioned at the center of the network with extensive connections, signifying its role as a primary focus in scientific discussions on educational innovation and knowledge dissemination. Additionally, "social media" and "knowledge management" exhibit strong interconnections, highlighting the crucial role of digital technology in supporting educational information dissemination.

Furthermore, this visualization demonstrates the relationship between educational innovation and various other aspects, such as "higher education," "learning," and "sustainable development," which are grouped within the green cluster. This suggests that educational innovation is frequently associated with sustainable development and knowledge management in the context of higher education. Meanwhile, the blue and red clusters emphasize the healthcare sector, where "health care personnel" and "medical information" are closely linked to information dissemination and its societal impact.

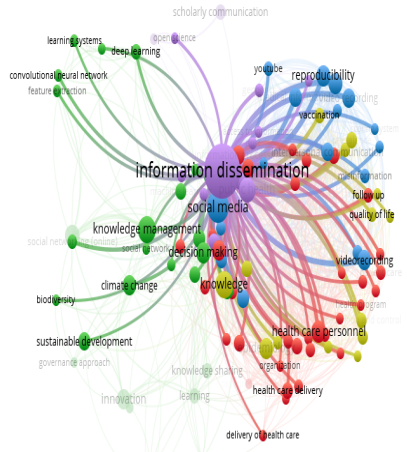

Figure 4a. Purple Cluster

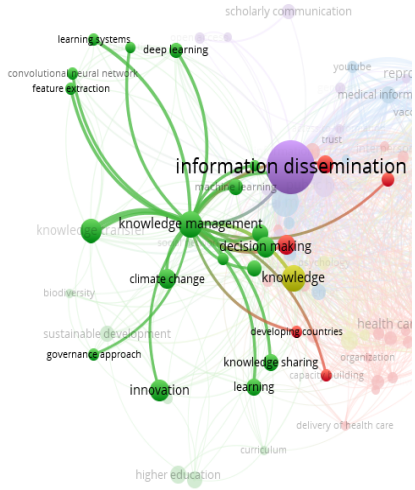

Figure 4b. Green Cluster

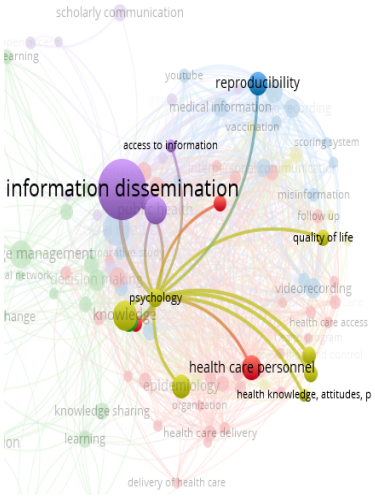

Figure 4c. Yellow Cluster

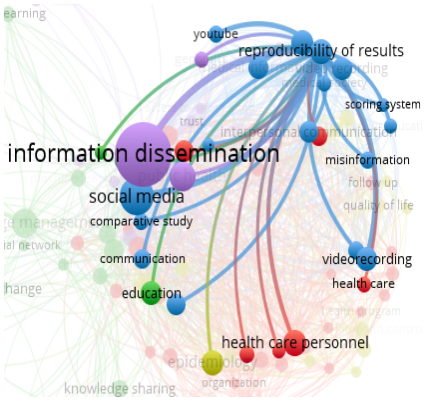

Figure 4d. Blue Cluster

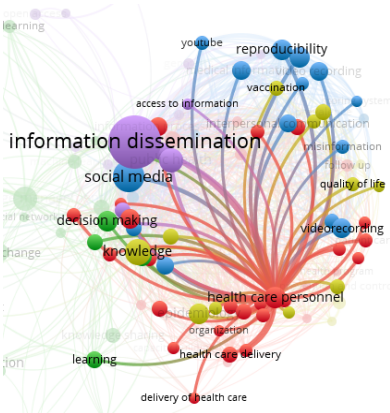

Figure 4e. Red Cluster

The findings from this visualization support the study titled "Mapping Educational Innovation and Knowledge Dissemination: A Global Bibliometric Study," illustrating how educational innovation intersects with various scientific domains and how knowledge is disseminated through different information channels, including social media and scholarly communication. Below is an explanation of each cluster (Figure 4).The first purple cluster in this visualization represents topics related to scholarly

communication and information dissemination across various contexts. The largest node in this cluster, "information dissemination," serves as the central point of the network, highlighting its role as a key concept that connects multiple disciplines. Other significant nodes within this cluster, such as "scholarly communication," "open science," and "reproducibility," indicate a strong focus on how scientific information is produced, shared, and validated within academic and professional communities.

Additionally, the purple cluster is closely associated with "social media," which plays a crucial role in information dissemination. Its connection to terms like "YouTube," "vaccination," and "medical information" suggests that social media is not only used within academic settings but also serves as a major platform for the dissemination of health-related information, which has broad societal impacts. Thus, this cluster underscores the essential role of scientific communication in ensuring the accessibility, transparency, and validity of information across various fields, including education, healthcare, and public policy.

The second green cluster in this visualization focuses on topics related to knowledge management, innovation, and sustainable development. The term "knowledge management" is at the center of this cluster, emphasizing its critical role in various aspects, including innovation, education, and sustainability. Several key nodes that are closely connected include "learning systems," "deep learning," and "convolutional neural networks," indicating that artificial intelligence and machine learning technologies are strongly linked to knowledge management and dissemination.

Furthermore, this cluster highlights the relationship between "innovation," "climate change," and "sustainable development," illustrating how innovation contributes to addressing environmental and sustainability challenges. Terms such as "higher education," "curriculum," and "learning" establish a connection between this cluster and the field of education, reinforcing the idea that innovation in learning and knowledge management plays a crucial role in curriculum development and effective learning strategies. The green cluster's association with information dissemination further indicates that successful knowledge management and innovation rely heavily on the efficient distribution of information across various sectors, including education, environmental studies, and public policy.

The third yellow cluster in this visualization is closely related to "health care personnel," "psychology," and "quality of life." This cluster highlights the connection between healthcare professionals, psychological aspects, and quality of life in the context of information dissemination and healthcare systems.

Health Care Personnel

This cluster is linked to topics such as health knowledge, attitudes, and the role of healthcare professionals in information dissemination. It highlights how healthcare personnel contribute to educating the public or patients, emphasizing their role in ensuring that accurate and relevant health information reaches communities effectively.

Psychology

It plays a role in how individuals receive and process health information. This is also related to how the psychological aspects of healthcare professionals influence the way they communicate information to patients.

Quality of Life

It illustrates the impact of information dissemination on societal well-being, encompassing factors such as patients' understanding of treatment, adherence to medical procedures, and the balance between physical and mental health.

Overall, this cluster highlights the interconnection between healthcare professionals, psychology, and quality of life in the context of medical and health-related information dissemination. This is crucial for enhancing the effectiveness of health communication and ensuring that the information shared contributes to the well-being of individuals and society.

The fourth cluster, represented in red in the visualization, centers around "health care personnel" and is closely linked to the concept of information dissemination within healthcare services. This

cluster illustrates how healthcare professionals play a role in the distribution of information, medical communication, and healthcare service systems.

Health Care Personnel
Serving as the core of the red cluster, it highlights the role of healthcare personnel as key intermediaries in disseminating medical information to the public and patients. It is closely associated with healthcare organizations, healthcare service delivery, and video recordings that can be used for educational purposes and medical documentation.

Videorecording
It has a strong connection with healthcare personnel, potentially reflecting the use of video as a tool in medical education or the dissemination of health information to the public. It is also related to clinical documentation or telemedicine in enhancing access to healthcare services.

Health Care Delivery
It reflects the process of delivering effective healthcare services and how information about treatment, procedures, and medical policies is communicated to patients.

Organization
It refers to the structures and systems within healthcare services that support medical professionals in educating the public and enhancing the effectiveness of health communication.

Overall, this red cluster highlights the role of healthcare personnel in disseminating information, whether through direct communication, educational videos, or healthcare service structures that facilitate knowledge transfer to the public. In the context of educational innovation, the "health" cluster shown in bibliometric visualization reflects the linkages between health and education fields, particularly in the aspect of information dissemination and training medical personnel. Healthcare workers play a big part in getting medical information to people who need it. This suggests that healthcare should be taught, both directly with patients and through technologies like video recordings for medical training and telemedicine. This indicates that educational innovation is limited to the conventional academic environment and extends to the health sector through technology-based learning methods and interactive media to improve medical personnel's competence and public awareness of health. Furthermore, the relationship between this cluster and educational innovation can be interpreted as an interdisciplinary indication, in which the health and education fields are converging on knowledge dissemination and service quality improvement. The use of video recordings and telemedicine systems, for example, supports the effectiveness of medical communication and serves as a means of technology-based learning that can be adopted in the medical personnel training curriculum. So, the cluster isn't just random noise in the bibliometric data; it shows how new ideas are being used in education are spreading beyond traditional schools, especially to help people learn professional skills in the health field.

The blue cluster in this visualization is closely related to "reproducibility of results," reflecting aspects of reliability, validity, and transparency in research and the dissemination of medical information. This cluster emphasizes the importance of ensuring that information shared through various media is verifiable and trustworthy.

Reproducibility of Results
It serves as the core of the blue cluster, emphasizing the importance of accuracy and reproducibility in research and disseminated health information. It is closely related to scientific methods, data validation, and public trust in medical information.

YouTube & Videorecording
It indicates that digital media, such as YouTube, play a role in the dissemination of health information. The use of videos in medical communication can serve as an educational tool, but it can also become a source of misinformation if not supported by reproducible data.

Scoring System & Communication
It reflects how health information should be communicated clearly and based on data that can be re-examined. Evaluation systems can play a role in assessing the quality of information circulating, both in research and public education.

Misinformation & Follow-up

It indicates that the dissemination of inaccurate information can influence public perception and decision-making in healthcare. A follow-up process is necessary to ensure that the information provided is accountable and can be re-evaluated.

Overall, the blue cluster highlights the importance of transparency and reliability in the dissemination of health information, especially through digital media. As communication technology continues to evolve, the main challenge is to ensure that the information circulating is credible and does not mislead the public.

Figure 5. Word Cloud of the Most Common Topics in Research Based on RStudio Analysis

The image above represents a word cloud, which is a visual representation of the most frequently occurring words in a text corpus or dataset. The size of each word in this word cloud reflects its frequency—the larger the word, the more frequently it appears in the analyzed data.

In this word cloud, the most dominant term is "information dissemination," indicating that this topic is the primary focus of the dataset used. Other prominent words include "human," "humans," "article," "social media," "knowledge," and "coronavirus disease 2019," suggesting a strong connection between research on information dissemination, social media, scientific studies, and the COVID-19 pandemic.

Additionally, several terms related to scientific research appear, such as "reproducibility of results," "controlled study," and "qualitative research," indicating that the analysis may be derived from academic literature or scientific studies. Words such as "public health," "pandemic," "medical information," and "health care personnel" suggest a strong correlation between this research and the field of public health and information dissemination within healthcare contexts.

Other words in the cloud, such as "male," "female," "adult," and "child," indicate a demographic-based analysis in the study. Meanwhile, terms like "innovation," "decision making," and "global health" point toward strategic issues related to policy and the impact of information dissemination.

Overall, this word cloud reflects the central themes of the research, which focus on information dissemination, particularly within the context of healthcare and social media, with relevance to the COVID-19 pandemic and scientific research.

This study explores aspects of educational innovation and knowledge dissemination within a specific analyzed context. It may cover new learning methods, technologies used in education, or innovative ways to distribute knowledge in academic and industrial environments. The findings may include empirical evidence on the effectiveness of specific educational innovations, patterns of idea dissemination, and factors influencing the adoption of these innovations.

The study provides insights into how new ideas spread within academic and professional environments, including the barriers and driving factors in the innovation adoption process. Additionally, mapping educational innovation helps in understanding knowledge distribution networks and their impact on education and learning systems on a broader scale (Woods et al., 2025).

Digital connectivity can enhance innovation, but its impact depends on a specific combination of digital technology resources, digital architecture, and digital intelligence capabilities within an organization. This study identifies four key mechanisms in leveraging digital connectivity for

innovation: enablers, facilitators, amplifiers, and orchestrators. The right combination of digital resources and organizational capabilities can lead to both radical and incremental innovation. Digital architecture and organizational agility play a crucial role in incremental innovation, whereas digital technology and organizational openness are more influential in radical innovation. However, not all companies benefit equally, and the effectiveness of digital strategies depends on how well an organization manages these resources (Cheng & Miao, 2025).

Educational innovation, particularly through the integration of technology, has significantly transformed learning models over the past 40 years. These changes include the transformation of teaching methods, the role of teachers as facilitators, the adoption of hybrid learning models, and technology-based assessments. This study also highlights the importance of a mixed-methods research approach in evaluating the effectiveness of educational innovation by combining qualitative and quantitative data to achieve a more comprehensive analysis.

Furthermore, the research demonstrates that technologies such as mobile learning, learning analytics, and digital learning platforms can enhance learning experiences and expand access to education. Therefore, this study emphasizes that mapping educational innovation and knowledge dissemination should focus on the effective implementation of technology, learner-centered approaches, and research-based practices.

Technology is not merely a tool for learning but also serves as a medium for disseminating knowledge to a broader audience. Through a data-driven and innovation-oriented approach, this study provides insights into how education systems can adapt more effectively to modern advancements and the evolving needs of learners (Rubia-Avi, 2023).

The use of short videos can enhance undergraduate students' understanding of Geographic Information Systems (GIS) in the fields of Earth and environmental sciences. This study found that although GIS offers numerous benefits in spatial data management and addressing environmental challenges, it remains underutilized in higher education. To address this issue, the authors developed 11 short videos featuring scientists from diverse backgrounds who share their professional experiences using GIS to solve real-world problems.

Students who watched these videos became more interested in GIS applications, particularly in entrepreneurship and global change mitigation. Additionally, the videos introduced social aspects such as gender equality, international mobility, and career transitions between the public and private sectors, enriching students' perspectives on their career opportunities. Thus, this approach effectively transferred knowledge from research to university education and strengthened students' spatial data management skills in Earth sciences. By utilizing short videos as an educational tool, this study demonstrates how technology can facilitate faster information dissemination, improve students' understanding of complex concepts, and inspire them to apply GIS in various fields (DeFelipe et al., 2024).

Therefore, this study reinforces the crucial role of educational innovation mapping and knowledge dissemination in enhancing learning effectiveness and expanding global access to information. The integration of digital technology, data-driven learning strategies, and interactive media—such as short videos—serves as a key factor in accelerating the adoption of innovation across disciplines. Furthermore, digital connectivity and optimal management of technological resources enable the development of a more adaptive, inclusive, and sustainability-oriented educational environment.

A deeper understanding of the drivers and barriers of educational innovation is essential for designing more effective policies and implementation strategies to address the challenges of the digital transformation era.

This graph (Figure 6) is a thematic map generated from bibliometric analysis using RStudio with the Bibliometrix package. It illustrates various research themes based on their degree of development (density) and degree of relevance (centrality).

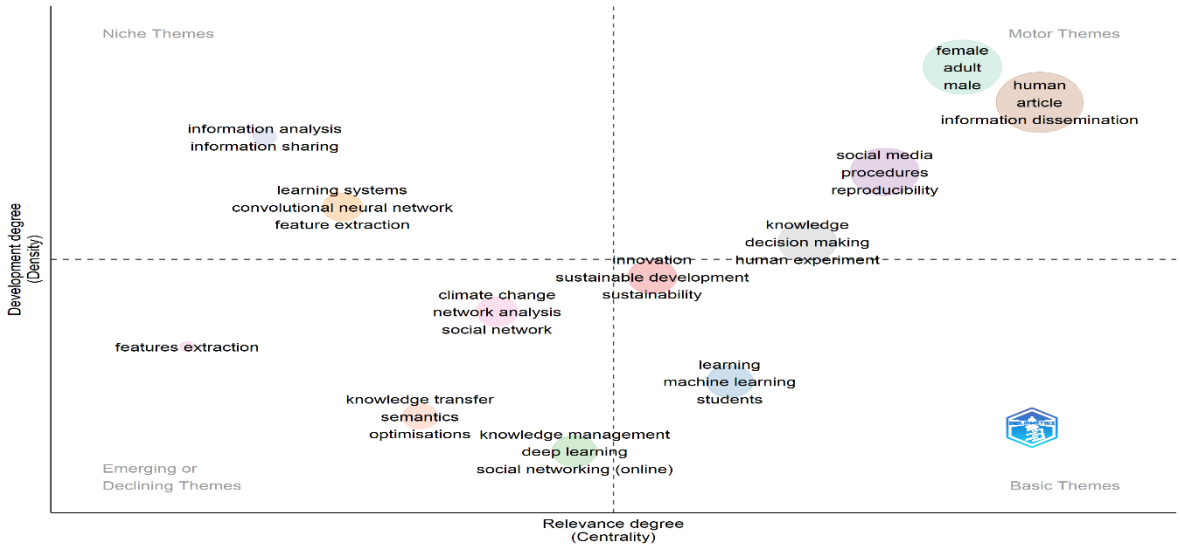

Figure 6. Visualization of Future Keyword Predictions

Themes in the upper right quadrant (Motor Themes), such as information dissemination, human article, and social media, have both high relevance and high development. This indicates that these themes are currently crucial in research fields and are likely to remain prominent in the future.

Meanwhile, themes in the lower right quadrant (Basic Themes), such as learning, machine learning, and students, also have high relevance but are still undergoing broader development. These themes form the foundation of research and are expected to continue evolving as fundamental aspects of future studies.

On the other hand, themes in the upper left quadrant (Niche Themes), such as information analysis, learning systems, and feature extraction, show high development but limited relevance to specific fields. This suggests that these topics are growing within specialized communities and could become more significant if they attract greater attention.

The lower left quadrant (Emerging or Declining Themes) contains themes such as knowledge transfer, semantics, and deep learning, which are either in the early stages of development or experiencing a decline in relevance. However, certain topics, such as deep learning and social networking, still have the potential for further growth depending on future research trends.

Based on this analysis, it can be concluded that themes such as information dissemination, social media, machine learning, and deep learning have significant potential for continued growth and will likely remain key research trends in the future.

There are some problems with this study. For example, the use of Scopus databases could be biased and leave out studies from other sources that might have been relevant. Also, the study only looked at data from three years (2023–2025), which might make it harder to understand long-term trends in educational innovation. Also, because of differences in educational infrastructure and access to technology, the results may not be fully applicable to developing countries. If you want to be sure that "technology enhances educational creativity," you should find a direct correlation between the keywords "technology" and "creativity" in a bibliometric analysis. If empirical relationships are not found in the data, then interpretations of the role of technology in improving creativity should be re-examined or supported with more specific, additional literature.

Conclusions

This study underscores the critical role of mapping educational innovation and knowledge dissemination through a bibliometric approach. By analyzing Scopus-indexed publications (2023–2025), this research identifies key trends, dominant themes, and influential contributors in the field. Utilizing a systematic bibliometric process—encompassing data retrieval, preprocessing, network

extraction, and visualization via VOSviewer—the study provides a comprehensive overview of the evolving landscape of educational innovation. The findings highlight information dissemination as a central theme, closely linked to social media, knowledge management, and the sustainability of higher education. The thematic clustering further reveals intersections between educational innovation and fields such as psychology, healthcare, and sustainability. Moreover, keyword mapping indicates that digital technology, artificial intelligence, and data-driven learning serve as fundamental drivers of innovation in education. Additionally, the study reveals that digital connectivity facilitates innovation, yet its impact is contingent upon the integration of technology, institutional strategies, and organizational adaptability. The integration of media—particularly short videos—has been shown to significantly enhance students' comprehension of complex subjects, such as Geographic Information Systems (GIS) in environmental sciences. In conclusion, this research reinforces the imperative for educational innovation to be anchored in effective technological implementation, data-driven methodologies, and an inclusive approach to knowledge dissemination. The findings suggest that emerging technologies, such as machine learning, social media, and knowledge dissemination strategies, will remain at the forefront of future research in educational innovation. These insights provide a foundation for policymakers, educators, and researchers to design more adaptive, technology-driven, and sustainable educational models in the digital era.

References

Amiel, T., & Reeves, T. C. (2008). Design-based research and educational technology: Rethinking technology and the research agenda. *Journal of Educational Technology & Society*, *11*(4), 29–40.

Amini, M., Ravindran, L., & Lee, K.-F. (2024). Adapting education shifts in Malaysia after COVID-19: A comprehensive review of flexible assessments, lifelong learning initiatives, and diversified learning trajectories. *Asian Journal of Assessment in Teaching and Learning*, *14*(1), 1–14.

Balasubramanian, S., Shukla, V., Islam, N., Upadhyay, A., & Duong, L. (2025). Applying artificial intelligence in healthcare: lessons from the COVID-19 pandemic. *International Journal of Production Research*, *63*(2), 594–627.

Barrenechea, I., Beech, J., & Rivas, A. (2023). How can education systems improve? A systematic literature review. *Journal of Educational Change*, *24*(3), 479–499.

Bellei, C., & Muñoz, G. (2023). Models of regulation, education policies, and changes in the education system: a long-term analysis of the Chilean case. *Journal of Educational Change*, *24*(1), 49–76.

Bischoff, K., Volkmann, C. K., & Audretsch, D. B. (2018). Stakeholder collaboration in entrepreneurship education: an analysis of the entrepreneurial ecosystems of European higher educational institutions. *The Journal of Technology Transfer*, *43*, 20–46.

Chen, X., Zou, D., Xie, H., & Cheng, G. (2021). Systematic Evaluation of Research Progress on Technology-Enhanced Language Learning: Content Analysis and Knowledge Mapping. *International Symposium on Emerging Technologies for Education*, 334–343.

Cheng, C., & Miao, Z. (2025). Leveraging digital connectivity for innovation performance: a fsQCA study on Chinese high-tech manufacturing firms. *Humanities and Social Sciences Communications*, *12*(1), 1–12. https://doi.org/10.1057/s41599-025-04372-3

Dai, C.-P., & Ke, F. (2022). Educational applications of artificial intelligence in simulation-based learning: A systematic mapping review. *Computers and Education: Artificial Intelligence*, *3*, 100087.

De Wit, H., & Altbach, P. G. (2021). Internationalization in higher education: Global trends and recommendations for its future. *Policy Reviews in Higher Education*, *5*(1), 28–46.

DeFelipe, I., Jerez-Longres, P. S., Pérez-Cáceres, I., Valenzuela, P., Galve, J. P., Rodríguez-Ruano, S., Ortega, Z., Adrados, L., Bernabé, J. M., Crespo, J., Montes, R. M., Pereira, L., & Ballesteros, D. (2024). Enhancing Earth and Environmental Science Undergraduate Students' Perception of Geographic Information Systems through Short Clips. *Education Sciences*, *14*(9), 1–18. https://doi.org/10.3390/educsci14091026

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296.

Eck, N. J. Van, & Waltman, L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact* (pp. 285–320). Springer.

Gan, Y., Li, D., Robinson, N., & Liu, J. (2022). Practical guidance on bibliometric analysis and mapping knowledge domains methodology–A summary. *European Journal of Integrative Medicine*, *56*, 102203.

Gao, P., Li, J., & Liu, S. (2021). An introduction to key technology in artificial intelligence and big data driven e-learning and e-education. *Mobile Networks and Applications*, *26*(5), 2123–2126.

Hamlaoui, S. (2021). Teachers' resistance to educational change and innovations in the Middle East and North Africa: A case study of Tunisian universities. *Re-Configurations*, 171.

Isaeva, R., Karasartova, N., Dznunusnalieva, K., Mirzoeva, K., & Mokliuk, M. (2025). Enhancing learning effectiveness through adaptive learning platforms and emerging computer technologies in education. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi*, *9*(1), 144–160.

Janik, A., Ryszko, A., & Szafraniec, M. (2021). Exploring the social innovation research field based on a comprehensive bibliometric analysis. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(4), 226.

Kuzmenko, A., Chernova, T., Kravchuk, O., Kabysh, M., & Holubenko, T. (2023). Innovative Educational Technologies: European Experience and its Implementation in the Training of Specialists in the Context of War and Global Challenges of the 21st Century. *Journal of Curriculum and Teaching*, *12*(5).

Lee, K., & Fanguy, M. (2022). Online exam proctoring technologies: Educational innovation or deterioration? *British Journal of Educational Technology*, *53*(3), 475–490.

Li, M. (2024). Adapting legal education for the changing landscape of regional emerging economies: A dynamic framework for law majors. *Journal of the Knowledge Economy*, *15*(3), 10227–10256.

Liu, M., Ren, Y., Nyagoga, L. M., Stonier, F., Wu, Z., & Yu, L. (2023). Future of education in the era of generative artificial intelligence: Consensus among Chinese scholars on applications of ChatGPT in schools. *Future in Educational Research*, *1*(1), 72–101.

Makda, F. (2025). Digital education: Mapping the landscape of virtual teaching in higher education–a bibliometric review. *Education and Information Technologies*, *30*(2), 2547–2575.

Maral, M. (2024). A bibliometric analysis of global research on education in the Scopus database, 2013–2022. *Global Knowledge, Memory and Communication*.

Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, *5*(1), 1653531.

Metni, E. (2022). *Exploring Lebanese teachers' engagement in a low-cost, technology-enhanced, problem-solving, orientated learning intervention with refugee children*. UCL (University College London).

Mian, S. H., Salah, B., Ameen, W., Moiduddin, K., & Alkhalefah, H. (2020). Adapting universities for sustainability education in industry 4.0: Channel of challenges and opportunities. *Sustainability*, *12*(15), 6100.

Miranda, J., Navarrete, C., Noguez, J., Molina-Espinosa, J.-M., Ramírez-Montoya, M.-S., Navarro-Tuch, S. A., Bustamante-Bello, M.-R., Rosas-Fernández, J.-B., & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers & Electrical Engineering*, *93*, 107278.

Naz, F., & Murad, H. S. (2017). Innovative teaching has a positive impact on the performance of diverse students. *Sage Open*, *7*(4), 2158244017734022.

Noyons, E. C. M. (1999). *Bibliometric mapping as a science policy and research management tool*. Leiden University.

Nye, B. D. (2015). Intelligent tutoring systems by and for the developing world: A review of trends and approaches for educational technology in a global context. *International Journal of Artificial Intelligence in Education*, *25*(2), 177–203.

Okoye, K., Hussein, H., Arrona-Palacios, A., Quintero, H. N., Ortega, L. O. P., Sanchez, A. L., Ortiz, E. A., Escamilla, J., & Hosseini, S. (2023). Impact of digital technologies upon teaching and learning in higher education in Latin America: an outlook on the reach, barriers, and bottlenecks. *Education and Information Technologies*, *28*(2), 2291–2360.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., & Brennan, S. E. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *International Journal of Surgery*, *88*, 105906.

Peters, H. P. F., & Van Raan, A. F. (1993). Co-word-based science maps of chemical engineering. Part I: Representations by direct multidimensional scaling. *Research Policy*, *22*(1), 23–45.

Plueger, C. T. (2024). *The Lived Experiences of Educators Leveraging Educational Technology and Connectivisim for Fostering Academic Achievement in Higher Education: A Transcendental Phenomenological Study*.

Prahani, B., Rizki, I., Jatmiko, B., Suprapto, N., & Tan, A. (2022). Artificial intelligence in education research during the last ten years: A review and bibliometric study. *International Journal of Emerging Technologies in Learning (IJET)*, *17*(8), 169–188.

Putri, R. (2024). Inovasi Pendidikan dengan Menggunakan Model Deep Learning di Indonesia. *Jurnal Pendidikan Kewarganegaraan Dan Politik*, *2*(2), 69–77.

Rubia-Avi, B. (2023). The Research of Educational Innovation: Perspective and Strategies. *Education Sciences*, *13*(1). https://doi.org/10.3390/educsci13010026

Sandoval Hamón, L. A., Ruiz Peñalver, S. M., Thomas, E., & Fitjar, R. D. (2024). From high-tech clusters to open innovation ecosystems: a systematic literature review of the relationship between science and technology parks and universities. *The Journal of Technology Transfer*, *49*(2), 689–714.

Serdyukov, P. (2017). Innovation in education: what works, what doesn't, and what to do about it? *Journal of Research in Innovative Teaching & Learning*, *10*(1), 4–33.

Sharma, A., Kosasih, E., Zhang, J., Brintrup, A., & Calinescu, A. (2022). Digital Twins: State of the art theory and practice, challenges, and open research questions. *Journal of Industrial Information Integration*, *30*, 100383.

Singun, A. J. (2025). Unveiling the barriers to digital transformation in higher education institutions: a systematic literature review. *Discover Education*, *4*(1), 37.

Southworth, J., Migliaccio, K., Glover, J., Glover, J., Reed, D., McCarty, C., Brendemuhl, J., & Thomas, A. (2023). Developing a model for AI Across the curriculum: Transforming the higher education landscape via innovation in AI literacy. *Computers and Education: Artificial Intelligence*, *4*, 100127.

Stecuła, K., & Wolniak, R. (2022). Advantages and disadvantages of e-learning innovations during COVID-19 pandemic in higher education in Poland. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(3), 159.

van Eck, N. J. (2010). *Vosviewer: A Computer Program for Bibliometric Mapping*. SSRN.

Waltman, L., Van Eck, N. J., & Noyons, E. C. M. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics*, *4*(4), 629–635.

Wang, C., Chen, X., Yu, T., Liu, Y., & Jing, Y. (2024). Education reform and change driven by digital technology: a bibliometric study from a global perspective. *Humanities and Social Sciences Communications*, *11*(1), 1–17.

Woods, C., Fitzpatrick, S., Lukersmith, S., Coulter, L., O'Neill, S., Savage, J. A., Moll, S., Bosanquet, K., Galdas, P., West, S., Bergeron, M., Shelton, J., Blume, A., Ditton-Phare, P., Nixon, R. D. V., Elizabeth, M., Hollerbach, B., Grillo, C., Heisel, M., … Darby, J. (2025). Sharing knowledge on implementing mental health and wellbeing projects for veterans and first responders. *Comprehensive Psychiatry*, *138*(December 2024). https://doi.org/10.1016/j.comppsych.2025.152579.

Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(1), 100233.