

Examining the Correlation between the Use of e-Learning Platforms' Tools and Instructors' Performance using A Bibliometric Study

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Abstract

This research analyses how e-learning platforms' capabilities affect instructors' performance pre- and post-pandemic and their influence on educational practices. This research utilises PRISMA to summarise works that link e-learning platforms' tools and instructors' performance to modern education. Scopus was chosen for its extensive coverage and reputation as a scholarly article analysis tool. VosViewer software let researchers graph and show database data linkages. Results were reduced to 1,422 relevant papers using inclusion and exclusion criteria. Educational technology, such as e-learning platforms and teacher performance, is not just trendy but essential. The focus on research reflects this shift. The list of significant publications, countries, and organisations contributing to this issue indicates their global impact. The study highlights the transdisciplinary nature of machine learning and education research by focusing on the most prolific authors and important keywords. The rise in author publications following the epidemic suggests that education has changed. Various teaching and learning approaches are offered with technology-based solutions, including e-learning platforms and instructor performance. The keywords and articles indicate how collaborative and diverse this study is. Designing the finest platformer tools for e-learning instructional strategies and improving instructors' digital platform performance requires ongoing study. The report suggests more research on e-learning platform technologies and instructor performance. To analyse, compare, and enhance the effect of e-learning platforms' tools and increase instructors' performance, apps, platforms, and approaches must be continuously developed to grow knowledge.

Keywords: Teachers' Performance, E-Learning Performance, E-Learning Platform Tools.

Introduction

The use of the educational sector is currently experiencing an international upsurge, proving to be an integral part of education as it began as a solution to the pandemic-induced shutdown in 2019–2021 when academic institutions were forced to close their physical classes and utilize (Alhayan & Abuhassna, 2024). the available applications of electronic learning and e-learning platforms (Niemczyk, 2021). Abuhassna & Alnawajha (2023b) argued there has been a growth in the creation of better virtual learning environments, and educators felt they needed to improve their performance in utilizing e-learning platform tools, and created cutting-edge techniques for instruction and learning that incorporate e-learning platform tools, teachers' performance, and processes, as well as other means of disseminating knowledge and learning objectives. As mentioned, (Yang et al., 2020), this approach was used on e-learning platforms to provide customized educational services to students and exchange information between teachers. This approach enabled e-learning platforms to easily integrate teaching information into individual teaching situations, while traditional learning did the opposite (Samsul et al., 2023). However, Zeng et al (2020) argued that this accelerating change has helped technologists' e-learning platform tools to find solutions and create a trend where educational institutions compete for the high-tech foundations and databases they need to implement and operate with fewer resources and lower costs, and most importantly, to reach more students, learners, and teachers. Understanding new technologies and learning methods educators use is critical to creating and maintaining quality assurance relationships in educational institutions (Abuhassna et al., 2022a). Self-learning and e-learning are becoming increasingly important, opening up new dimensions for e-learning outcomes, automated assessments, and virtual learning spaces. Khan and Bose (2021) emphasize that the primary goals of using e-learning platforms' tools in education are to use existing digital technology for learning innovatively and to improve traditional educational methods through modern teaching methods. The need for a comprehensive understanding of the intricate relationship between the integration of e-learning platforms' tools and teachers' performance and education in the post-COVID-19 era is the basis of this study. This bibliometric analysis aims to undertake a thorough examination of the many implications of e-learning platforms' tools and teachers' performance solutions in modern educational practice, with a focus on identifying trends, patterns, and shortcomings in the current body of research. The main objective of this study is to provide a comprehensive synthesis of the relevant academic literature that offers a nuanced perspective on the impact of e-learning platforms' tools and teachers' performance applications on academic practices. This study aims to make a scholarly contribution to the ongoing debate on e-learning platforms' tools and teachers' performance by examining the quality of learning outcomes in education and proposing pedagogical practices that are rigorous and have a positive impact on education as a whole. The aim of this bibliometric study was, therefore, to provide answers to the following research questions:

1. What is the distribution of e-learning platforms' tools and teachers' performances publication in the years 2013-2023?
2. What are the most relevant journals in e-learning platforms' tools and teachers' performances research?
3. What are the most significant countries in e-learning platforms' tools and teachers' performances research area?
4. What are the significant educational institutions in e-learning platforms' tools and teachers' performances research area?

5. What are the primary research keywords for e-learning platforms' tools and teachers' performances within the last decade?
6. What is the most important subject area involving e-learning platforms' tools and teachers' performances?
7. What is the most important subject area involving e-learning platforms' tools and teachers' performances?

Methodology

Research Design

This review bibliometric analyses based on PRISMA framework (Moher, et, al. 2010). This review aimed to Investigating the relationship between e-learning platforms and teachers' performance, top countries, top journals, top educational institutions, most prolific authors, and most trends and keywords in this research area (Abuuhassa, H., Freed, A., Mohamad, A.,2024). In addition, Mishra and Mishra (2023) found that the (PRISMA) framework helps authors improve their reporting and reviewers and editors to critically evaluate accessible systematic reviews. In addition to the PRISMA framework used for this bibliometric analysis, VosViewer was used extensively in this study for data visualization and analysis. According to Hassan Abuhasna, et al (2022b), VosViewer is a software program that facilitates the creation and analysis of bibliometric networks. These networks can consist of journals, publications, scientists, or even individual works. The networks are then created based on links such as co-authorship, citation, co-citation, and bibliographic linkage (Orduña-Malea & Costas, 2021). VosViewer greatly facilitated the mapping and analysis of the different networks that make up the digital learning research in our study. It helped to understand the relationships between different academic fields, identify key journals, publications, and authors, and graphically visualize trends (Abuhasna 2023). The software's interactive graphical user interface and ability to process large amounts of information enabled thorough data analysis. This supported the study's investigation and led to the identification of key trends and patterns related to educational research. Through the geographical organization of publications and collaboration between institutions and authors, VosViewer provided a broader overview of the global impact and research dynamics around e-learning platforms' tools and teachers' performance in education (Abuhasna & Alnawajha, 2023a).

Identification

Database Selection

This review took place on April 25, 2024. The Scopus database was selected as the main database for this review. Scopus database was chosen because it is one of the most proper databases for analyzing scientific papers

Search Strings

To ensure the retrieval of the studies selected, the researcher used the exact keywords, these keywords were "(teachers' performance e-learning," for instance, TITLE-ABS-KEY (teachers' and performance and e-learning). Moreover, publications for the last ten years were selected from 2013 to 2023, for instance "AND PUBYEAR > 2012 AND PUBYEAR < 2024 AND PUBYEAR > AND". In addition, the subject area was limited to computer science, social science, and arts and humanities, for instance (LIMITTO (SUBJAREA, "COMP") OR LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA , "ARTS"). Publications were limited to conference papers and articles only, as these are more relevant to the topic, which is considered new and

controversial, AND (LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar")). Publications in English were selected in this review, AND (LIMIT-TO (LANGUAGE, "English").

Inclusion and Exclusion Criteria

The search focuses only on English-language publications from 2013 to 2023 to illustrate the e-learning platforms’ tools and teachers’ performance before and after the pandemic period and what has triggered a change in skills and teachers’ performance of e-learning and its applications in many aspects and disciplines, especially in education, for this research. Conference papers and articles are included in this research as the topic area is current and there is an opportunity to include the latest contributions and research from emerging scholars interested in this study field (Samsul et al., 2023).

Table 1

Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
e-learning platforms’ tools and teachers’ performance	Any other subjects were excluded.
2013 -2023	All publications before 2013 were excluded. And 2024 publications were excluded.
Conference papers and Articles	Thesis, books, book chapters blogs.
English language	Any other languages

Screening and Selection

The main keywords used were “teachers’ performance e-learning”, so the initial search returned 2,135 documents. After applying the inclusion and exclusion criteria, as shown in Table 1, the publications were reduced to 1,422 as the final search, and 713 were excluded.

Inclusion and Reporting

The results of this bibliometric analysis are reported based on the PRISMA framework (see Figure 1). (Moher et al., 2010). Thus, the following section addresses the questions posed in the research.

Methodology

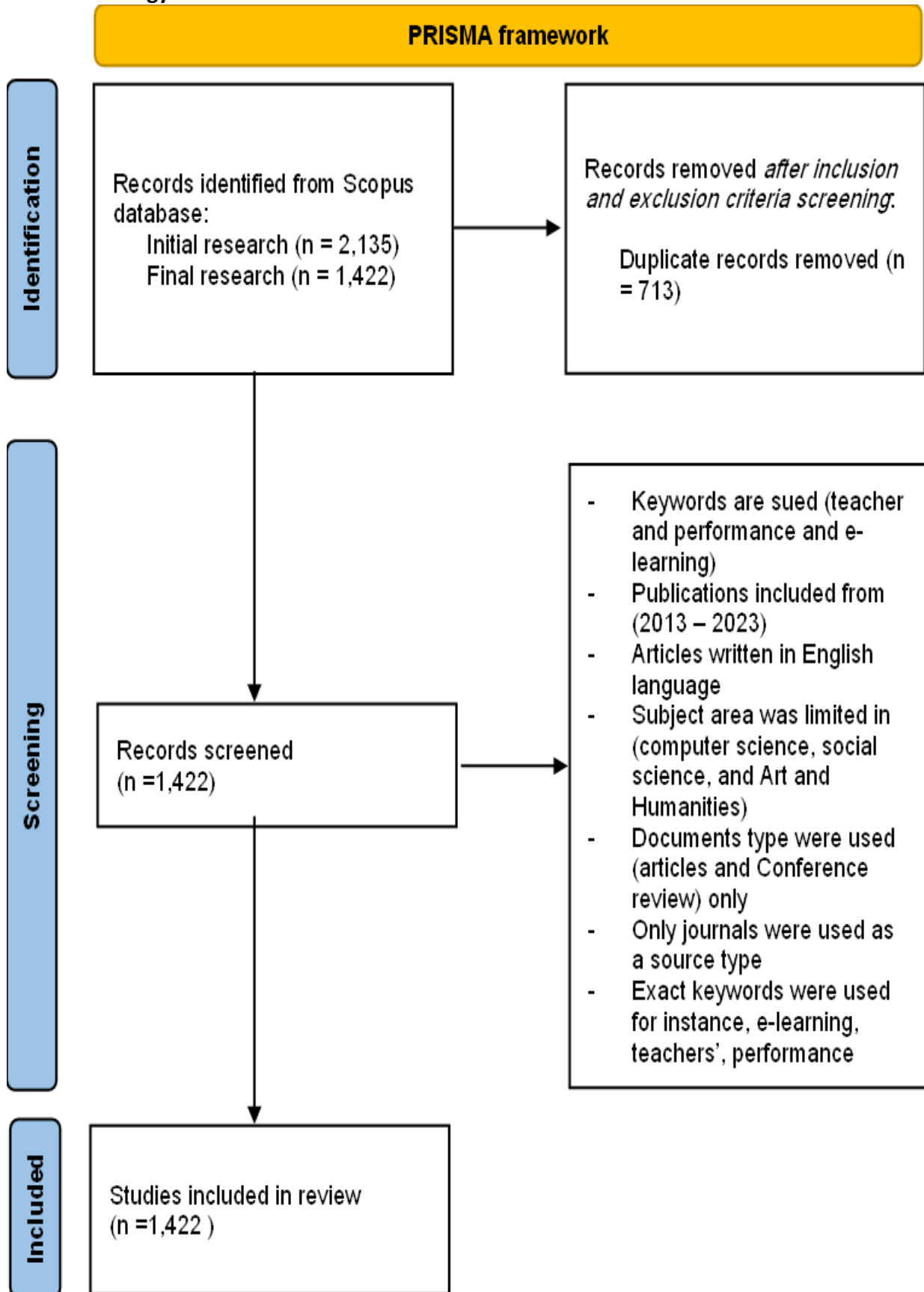


Figure 1 PRAMISA framework for this review

Results

This section presents all the results of a bibliometric analysis of the relationship between the e-learning platforms' tools and teachers' performance. This study provides insightful information on various facets of this ever-changing field and spans ten years of research. It covers prominent subject areas, publication trends, major countries and journals, key academic institutions, prolific authors, and primary research keywords. This summary aims to outline the evolution of the technology and applications in e-learning platforms' tools and teachers' performance research, identify the key elements driving academic research, and provide a comprehensive overview of global efforts to understand the impact of virtual learning environments on education. The primary research questions will be discussed by the researcher in this section.

The Distribution by Years

This section addresses the following research question: "What is the distribution of e-learning platforms' tools and teachers' performance publication in the years 2013 and 2023?" By analyzing the data provided, we can answer the first study question about the distribution of e-learning platforms' tools and teachers' performance integration in education from 2013 to 2023. According to the data, the number of publications on e-learning platforms' tools and teachers' performance integration in education has increased significantly over time, especially after 2019. The number of publications steadily increases each year.

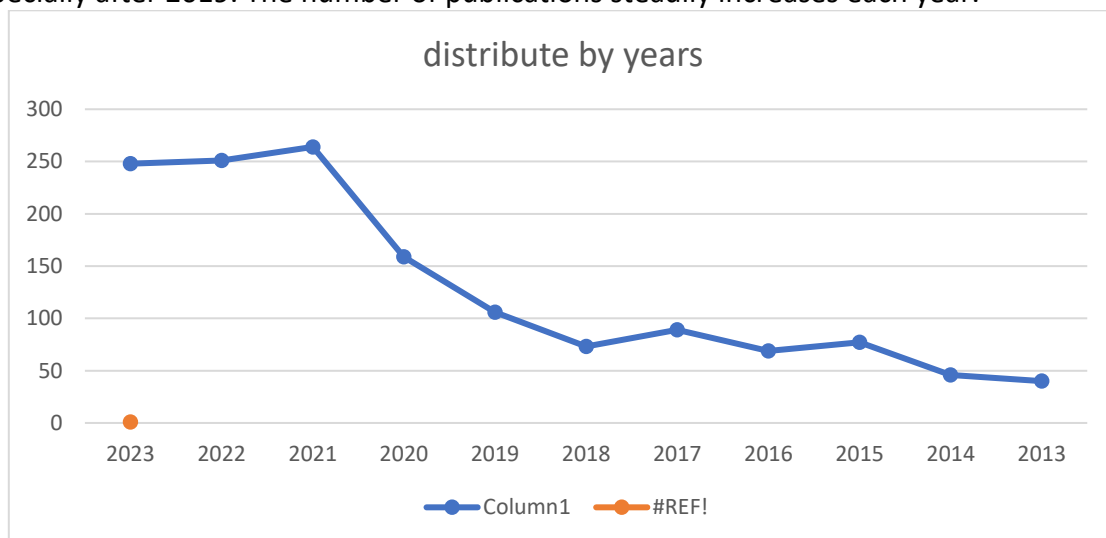


Figure 2 - The Distribution by Year

Figure 2, shows the distribution of teachers' performance on e-learning platforms in publications on the topic of education in the period from 2013 to 2023. There was a decrease in the quantity of research published in 2022, with 251 articles, while in 2023, there were fewer than 248 documents. Therefore, the drop in researchers' interest (teachers' performance on e-learning platforms) is not positive. compared the largest number of articles appeared in 2021, with around 246 publications; this indicates the highest researchers' interest was piqued during the COVID-19 pandemic, with 40 publications in 2013 and 46 in 2014 publications.

The Most Relevant Journals and Authors

This section addresses the second research question: "What are the most relevant journals on e-learning platforms' tools and teachers' performance research?" Table 2 shows the number of articles that make important contributions to this area, based on data from the top ten journals in the field of teachers' performance in e-learning research from 2013 to 2023.

Table 2

Top 10 Journals and authors in e-learning platforms' tools and teachers' performances research

Journal	TP	TC	Citation score	Most cited journal	Times cited	publisher
ACM International Conference Proceeding Series	43,510	50,307	1.5	<u>My AI Wants to Know if This Will Be on the Exam: Testing OpenAI's Codex on CS2 Programming Exercises</u>	48	ACM digital library
Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	76,908	200,792	2.6	<u>Swin-Unet: Unet-Like Pure Transformer for Medical Image Segmentation</u>	509	Springer Nature
Computers and Education	757	20,404	27.0	<u>Effects of artificial Intelligence–Enabled personalized recommendations on learners' learning engagement, motivation, and outcomes in a flipped classroom</u>	61	Elsevier
International Journal of Emerging Technologies in Learning	1,603	9,294	5.8	<u>Enhancement of Online Education in Engineering College Based on Mobile Wireless Communication Networks and IOT</u>	48	International Association of Online Engineering

Communications in Computer and Information Science	21,595	23,522	1.1	<u>Stratification of White Blood Cells Using Optimized DenseNet201 Model</u>	17	Springer Nature
IEEE Access	49,684	480,533	9.7	<u>Metaverse for Healthcare: A Survey on Potential Applications, Challenges and Future Directions.</u> Open Access	105	IEEE
CEUR Workshop Proceedings	20,932	22,260	1.1	<u>EVALITA 2023: Overview of the 8th Evaluation Campaign of Natural Language Processing and Speech Tools for Italian</u>	52	Sun SITE Central Europe
Smart Innovation, Systems and Technologies	10,131	11,272	1.1	<u>Critically Analyzing the Concept of Internet of Things (IOT) and How It Impacts Employee and Organizational Performance</u>	24	Springer Nature
Lecture Notes in Networks and Systems	41,445	35,437	0.9	<u>Natural Language Processing Implementation for Sentiment Analysis on Tweets</u>	65	Springer Nature
British Journal of Educational Technology	450	7,018	15.6	<u>The mediating effects of needs satisfaction on the relationships between prior knowledge and self-regulated learning through artificial intelligence chatbot</u>	21	Wiley-Blackwell

TP= Total publication, TC= Total citation

Table 2 shows that "Elsevier" had the most productivity among journals on the tools available on "e-learning platforms and performance of teachers." It had a citation rate of 27.0. And followed by "Wiley-Blackwell" with a citation rate of 15.6. According to the most productive journal in terms of total publications (TP), "Computers and Education" has the largest number of publications, with 757 publications in the subject area. The journal "British Journal of Educational Technology" has the lowest number of publications, with only 450. In terms of total citations (TC), the journal "IEEE Access" was in first place with 480,533, while the journal "British Journal of Educational Technology" had the fewest citations with 7,018. Journals with a high number of citations, a high number of publications, and notable publications have strongly influenced the development of research on e-learning platforms' tools and teachers' performance.

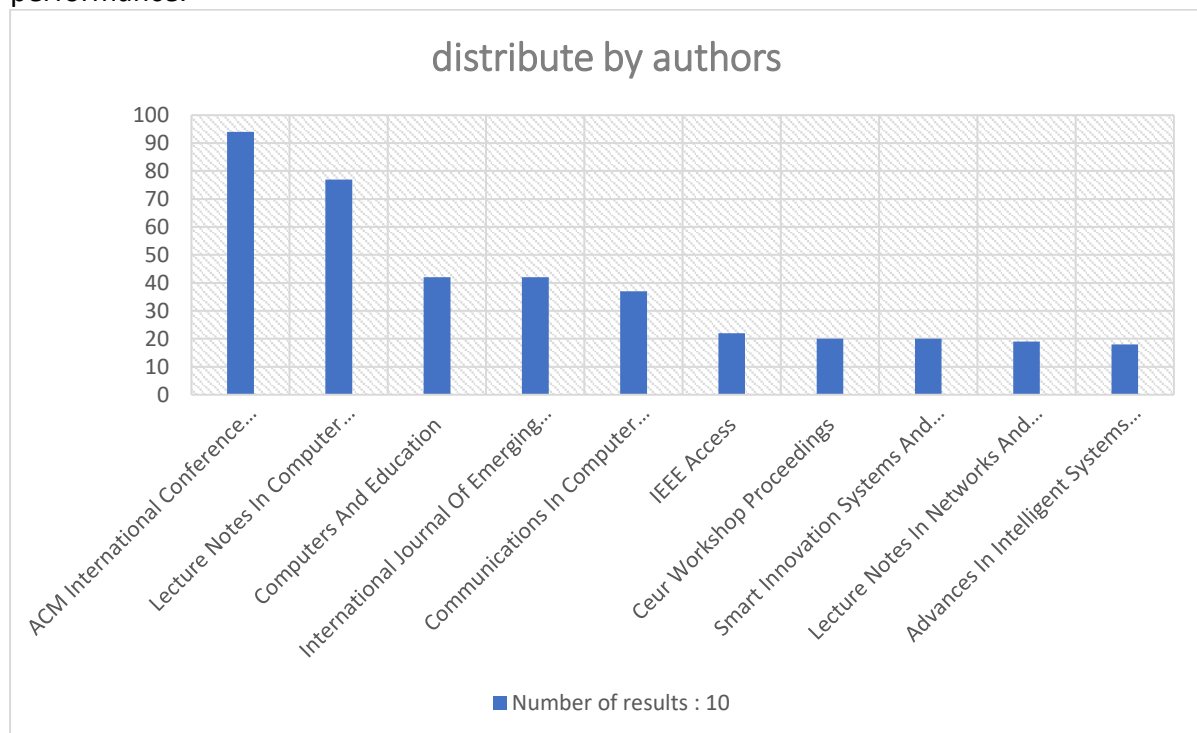


Figure 3. the Top 10 Journals and authors according to Scopus ranking,

During the data analysis process, the researcher chose the top 10 journals and authors in tools for e-learning platforms and teacher performance studies based on their Scopus ranking. The series "number of results: 10" point "ACM International Conference Proceeding Series" ranked first with a value of 94 journals. followed by "Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)" with a value of 77 journals. compare with the "Advances In Intelligent Systems And Computing" with a value of 18 journals.

The Most Significant Countries

To investigate the third question of the study: "What are the most important countries in terms of e-learning platform tools and teachers' performance in the field of research?" An examination of the data presented reveals a diverse global influence, as shown in (Figure 4.)

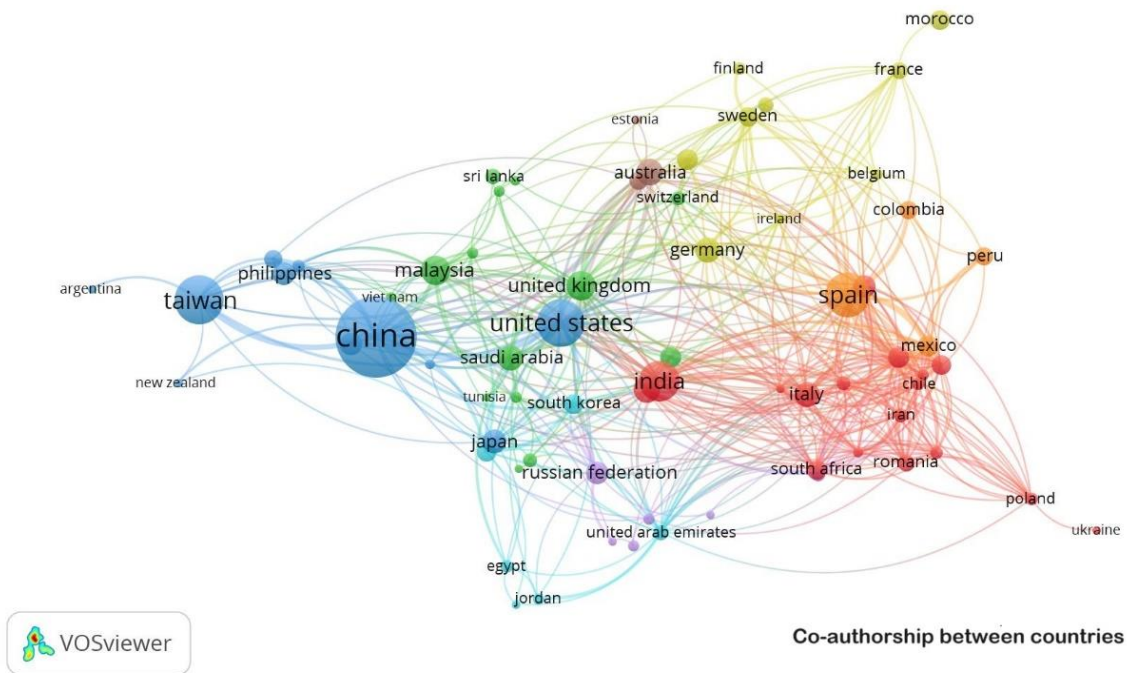


Figure 4. Top 10 countries e-learning platforms’ tools and teachers’ performances research Distribution of publications by country. China has led the world in exporting, distributing, and sharing its research. And importing, distributing, and sharing global research with other countries. Followed by, Taiwan and the United States of America. This indicates these countries' high interest in scientific research in "e-learning platforms’ tools and teachers’ performance." However, some countries appear to have very little interest in “e-learning platforms’ tools and teachers’ performance,” as shown in (Figure 4), where they share scientific research with one country only. Among these countries are: (New Zealand, Argentina, Morocco, and Ukraine)

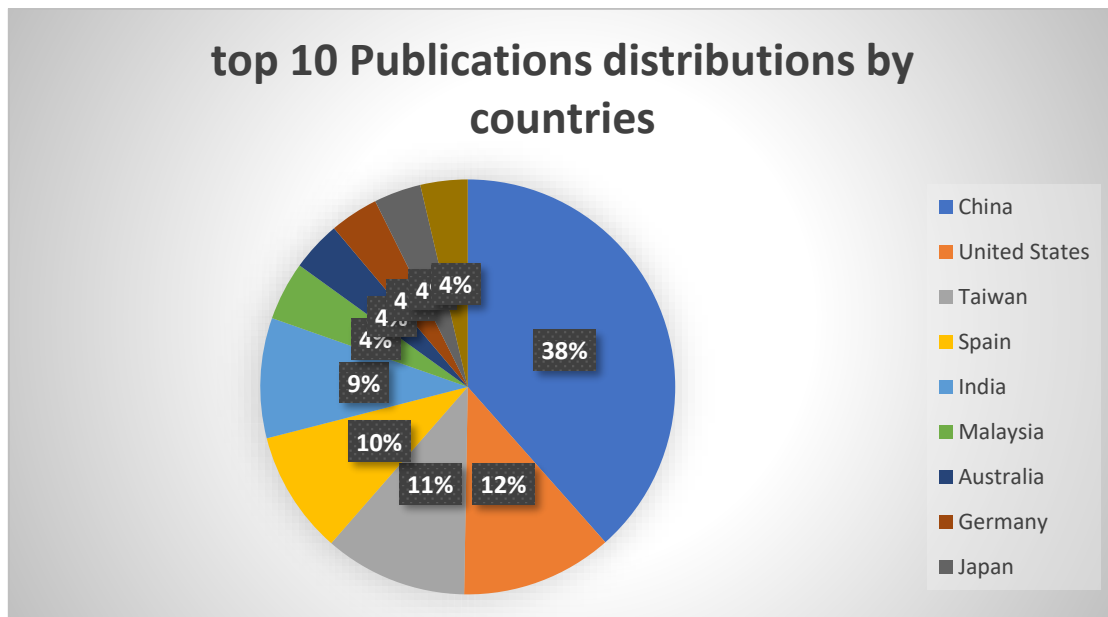


Figure 5. top 10 Publications distributions by countries

Figure 5. shows the most significant distribution of publications, with China leading the top ten nations in terms of publication volume with 345 articles, accounting for 38% of all publications in this research area. The United States is in second place with 106 articles, accounting for 12% of all publications. The distribution of articles published in this research area is 11% (100) in Taiwan, 10% (86) in Spain, and 9% (85) in India respectively. At the bottom of the list, five countries are tied with 4% of published articles each: Malaysia (41), Australia (35), Germany (34), Japan (33), and Saudi Arabia (33). These countries collectively account for a significant proportion of global academic research on e-learning platforms’ tools and teachers’ performance. This emphasizes the broad and diverse interest that exists across continents. The wide range of contributions illustrates the global importance of e-learning platforms in today's education systems and the international endeavor to understand their impact on education and learning.

The most Significant Educational Institutions

The data provided in response to the fourth research question, " What are the significant educational institutions in e-learning platforms’ tools and teachers’ performances research area?", highlights several educational institutions, as shown in Figure 6, Table 3, and Figure 7.

Table 3

The most significant educational institutions in e-learning platforms’ tools and teachers’ performance research within the last ten years.

Educational institutions	TP	countries
Central China Normal University	17	China
National Taiwan University of Science and Technology	15	Taiwan
Beijing Normal University	14	China
Universitat Oberta de Catalunya	13	Spain
South China Normal University	13	China
National Taiwan Normal University	10	Tiwan
Universidad de Salamanca	10	Spain
Chinese University of Hong Kong	9	Hong Kong
King Abdulaziz University	9	Saudi Arabia
Nanyang Technological University	9	Singapore

TP=total publication

Table 3 shows the ten most notable educational institutions that have contributed to this research area "e-learning platforms’ tools and teachers’ performance"China is the leading country in this research area, as 3 of the top 10 educational institutions are based in China These institutions are the "Central China Normal University, Beijing Normal University, and South China Normal University." The total number of publications (TP) was as follows: 17, 14, and 13. Taiwan followed in second place with two major institutions, "National Taiwan University of Science and Technology", with 15 total publications, and "National Taiwan Normal University", with 10 total publications. Spain is in third place with two major institutions "Universitat Oberta de Catalunya", with 13 total publications, and "Universidad de Salamanca" with 10 total publications. finally, Hong Kong, Saudi Arabia, and Singapore had the fewest total publications on this research topic, with 9 from the Chinese University of Hong Kong, King Abdulaziz University, and the Nanyang Technological University, respectively. Figure 6 illustrates the international distribution of publications.

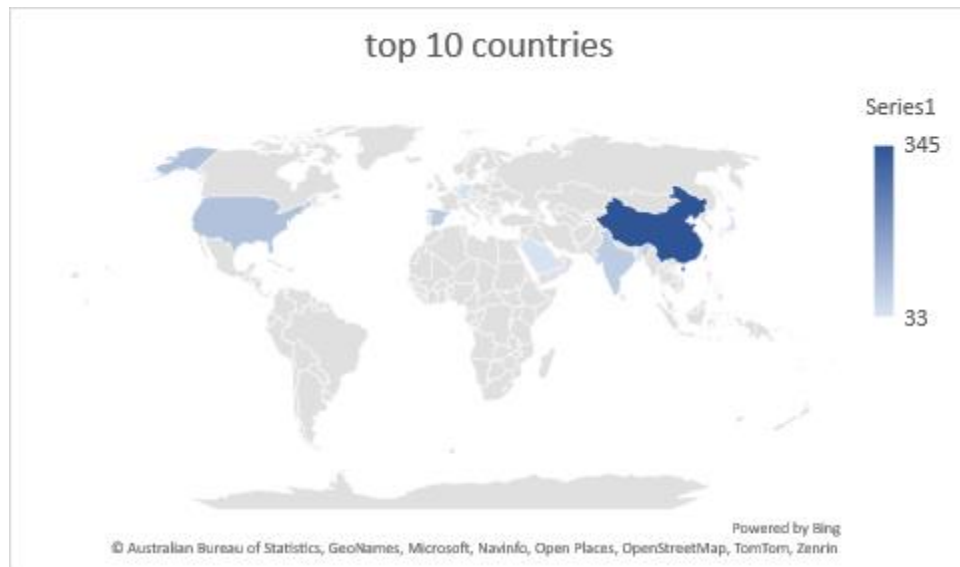


Figure 6. the geographical distributions of publications

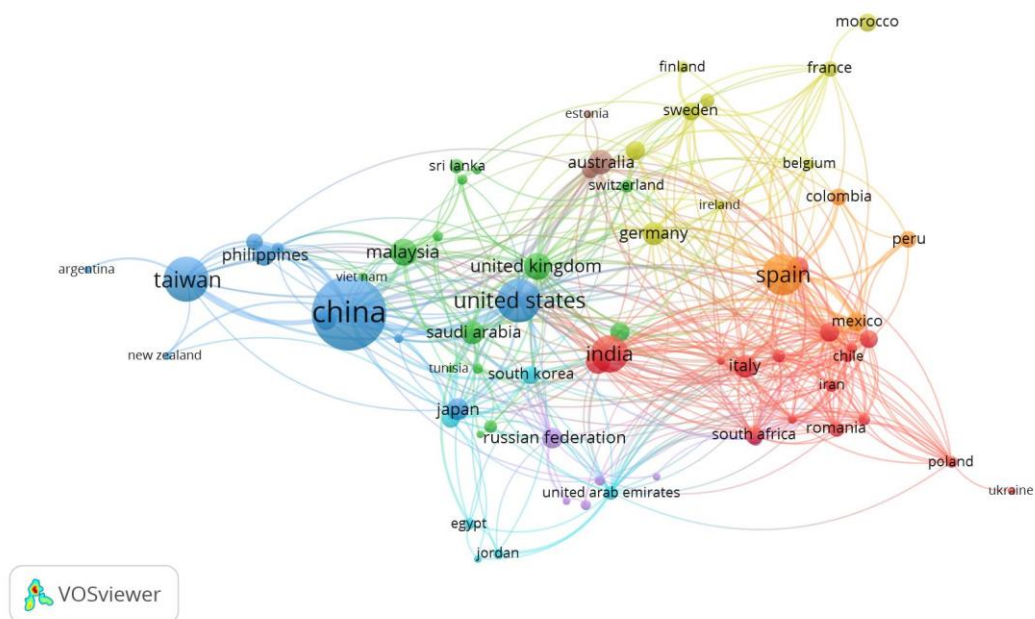


Figure 5: the geographical distribution based on VosViewer software

The international presence of these institutions in various countries emphasizes the global reach of research in “e-learning platforms’ tools and teachers’ performance”. Their remarkable contributions demonstrate the wide diversity of approaches and perspectives used in researching e-learning platforms’ tools and teachers’ performance and their impact on learning outcomes in education. This diversity not only enriches the field, but also contributes to a broader understanding of how e-learning platforms influence teachers' performance in educational practice across different educational methods and cultural connections.

The most Prolific Authors

Regarding the fifth research question: "What are the primary research keywords for e-learning platforms' tools and teachers' performances within the last decade?" The data in Table 4 highlights several authors who have made significant contributions to this area of study.

Table 4

The top 10 authors in the field of e-learning platforms' tools and teachers' performance in an education research area

Authors	Year of first publish	TP	h-index	TC	Current affiliation	country
Hwang, Gwojen	1995	556	77	23,382	National Taiwan University of Science and Technology.	Taiwan
Tsai, Chiawen Wen	2005	99	23	1,551	Ming Chuan University.	Taiwan
Achuthan, Krishnashree	2009	136	23	1,465	Amrita University, Amritapuri Campus.	India
Chen, Gwo-dong	1995	185	25	3,063	National Central University.	Taiwan
Farhan, Muhammad	2011	76	18	1,077	COMSATS University Islamabad,	Pakistan
Heffernan, Neil T.	1998	243	34	4,787	Worcester Polytechnic Institute.	United States
Iraola-Real, Ivan	2019	81	3	34	IUniversidad de Ciencias y Humanidades.	Peru
Jabbar, Sohail	2009	128	30	2,930	Manchester Metropolitan University.	United Kingdom
Jong, Morris Siu Yung	2006	160	30	2,516	Chinese University of Hong Kong.	Hong Kong
Liu, Qingtang	2003	192	20	1,210	Central China Normal University.	China

TP=Total published TC= Total citation

The most profound authors are listed in Table 4. Firstly, Guo-Jin Huang, Chair Professor one of the scholars of mobile e-learning and an editorial board member and reviewer for more than 30 academic journals position published. His first work in 1995, a remarkable 556 publications and an h-index of 77, equivalent to 23,382 citations. and is affiliated with the National Taiwan University of Science and Technology in Taiwan. Then comes researcher Tsai, Chiawen Wen, who started publishing in 2005 and to date has 99 articles with 1,551 citations and an h-index of 23. His affiliation with Ming Chuan University, in Taiwan. Since his first publication in 2009, Prof. Dr. Krishnashree Achuthan is the Dean of Postgraduate Programs at Amrita Vishwa Vidyapeetham. She holds 33 US patents has published a total of 136 publications, and achieved an h-index of 23. The 1,465 citations she has amassed and his affiliation with the Amrita University, Amritapuri Campus, in India. attest to his enduring and influential reputation in the field of " e-learning

educational, and educational technology". And Prof. Chen, Gwo-dong, who is associated with the same National Central University, in Taiwan has achieved a significant h-index of 25 with 185 published articles and 3,063 citations since he started in 1996. It illustrates the growing importance in field e-learning education and teachers' performance research. Farhan, Muhammad, an Assistant Professor and lecturer with the Department of Computer Science. specifically in online learning, has published 76 articles, been cited 1,077 times, and achieved an h-index of 18 since her start in 2011. COMSATS University Islamabad, in Pakistan. he highlights growing academic focus and research. Heffernan, Neil T., began publishing his work in 1998 and has since amassed an impressive 243 publications with an h-index of 34 and 4,787 citations. Affiliation with the Worcester Polytechnic Institute. in the United States. Interest in distance learning, educational data mining, and learning analytics. in Education is noteworthy and worth mentioning. Iraola-Real, Ivan. published his first paper in 2019. He has an h-index of 4 articles, 734 citations, and 81 publications. He is affiliated with the Universidad de Ciencias y Humanidades in Peru. Ass. Prof. Jabbar, Sohail. began his targeted research in 2009 and has written a total of 128 publications in the field of IOT object-oriented programming, which have been cited 2,930 times and have an h-index of 30. He is a guest editor of special issues and an associate editor in leading journals of his domain IOT. Researcher Prof. JONG Siu-yung . has been publishing since 2006, he has 2,516 citations and an h-index of 30, and he has published 160 papers. His research interests include learning sciences-technology, and technology-enhanced pedagogical design and implementation. He is a Prof. at the Department of Curriculum and Instruction, at the Chinese University of Hong Kong in Hong Kong. and the Director of the Centre for Learning Sciences and Technologies, CUHK. and Co-Chair of the IEEE Education Society Technical Committee on Learning Sciences, an Associate Editor of IEEE Transactions on Learning Technologies. finally, a prof. Liu Qingtang. He received 1,210 citations and an h-index of 20 with 192 publications. In 2003 he started with the first article. Affiliated with Central China Normal University, China. His research focuses on learning analytics. The impact application of newly developed education technologies, especially in e-learning, distance learning, web-based learning, and various fields. particular, the "e-learning platforms' tools and teachers' performance" to meet the internationally increasing demands of the new generation. which is becoming more and more advanced in terms of logical thinking and technological applications, is an emerging phenomenon that educators, teachers, and researchers are continuously concentrating on.

The Primary Research Keywords and Trends

In response to the sixth question: "What is the most important subject area involving e-learning platforms' tools and teachers' performances?". can be shown' the most important research terms and the frequency of their occurrence. in a figure,6.

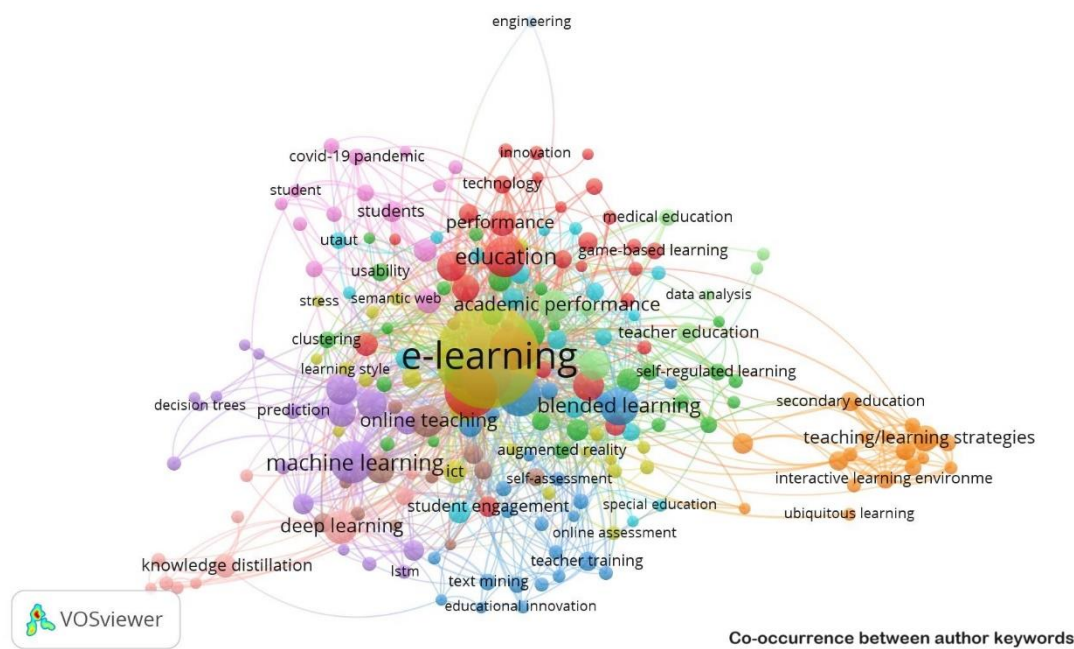


Figure 6: The primary research keywords and their occurrences

Figure 6 illustrates the most important research keywords. Over the past ten years, numerous terminologies have been used for research keywords expressing the integration of e-learning platforms' tools into teachers' performance, across different platforms, reflecting the wide range of interests in this area of research. The phrase "teachers' performance and e-learning" was the most frequently used keyword with 2,135 mentions, indicating its essential importance in educational research. The term "e-learning" was also used frequently, 384 times, emphasizing the primary aim of the research. The terms "learning analyses" and "COVID-19" appeared 91 and 69 times respectively, which also emphasizes the importance of using technological applications in education. The terms "online learning", "machine learning", "education", "higher education", "blended learning", and "distance learning" are frequently used to emphasize the conceptual basis of teachers' performance and e-learning approaches. The all-encompassing nature of the approach, expressed through the occurrence of "deep learning", "human", "curricula" and "computer-assisted instruction", as well as "decision making", suggests that it is a shift in perspective in education toward a more practical approach to decision making. A focused examination of specific areas such as "teachers' performance and e-learning" and "natural language processing systems" means focusing on the methods used for teachers' performance and e-learning in education and how technology is used throughout the process to promote learning through logic and decision making.

The most Important Subject Area

To answer the seventh question of this study: "What is the most important subject area involving e-learning platforms' tools and teachers' performances?". Based on the data provided, the most important topic area, weighing 43%, is computer science, which has an extensive collection of 1227 articles. This suggests that technical and technological components of educational e-learning, such as algorithm development, software

creation, and system architecture, are critical to understanding and improving educational outcomes when using e-learning platforms, as shown in Figure 7

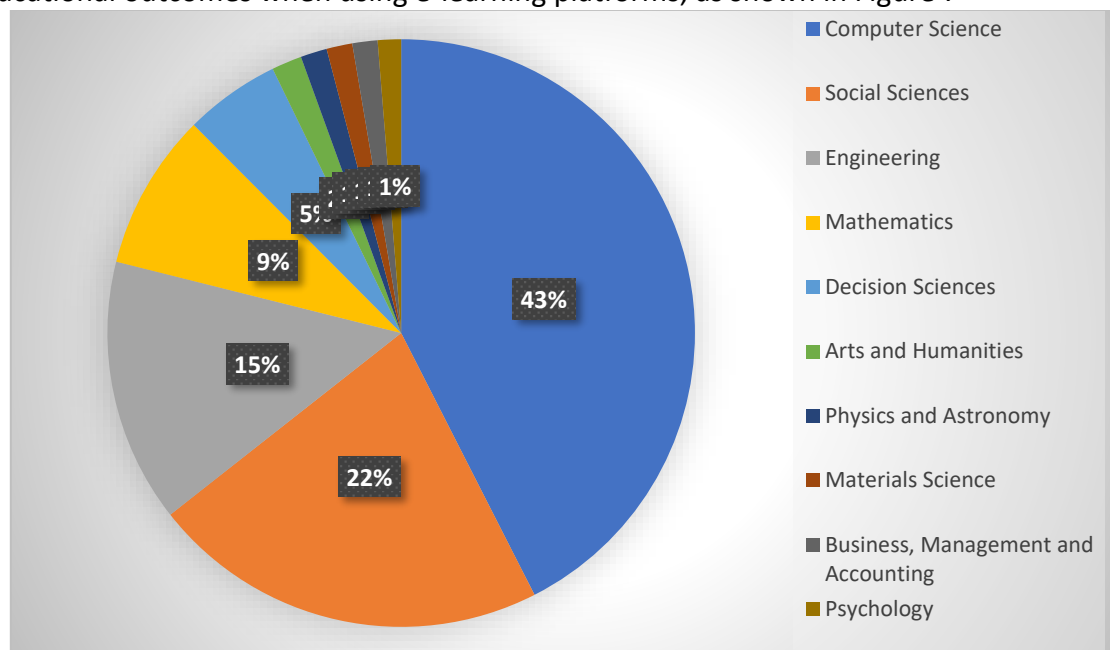


Figure 7: The most important subject area

According to Figure 7, the second area is the social sciences, which account for 22% of articles and have a strong interest in social, behavioral, and pedagogical implications of e-learning, as evidenced by the 632 articles close by. Engineering, which has 419 articles and accounts for 15% of the sample size, is another important area of interest as it deals with the application of engineering concepts in the development and improvement of e-learning platforms and technologies.

While mathematics made significant contributions to the discipline with 9%, for a total of 449 contributions, and decision sciences made significant contributions to the body of knowledge on the use of e-learning with 5%, for a total of 152 contributions, arts and humanities followed with 48 publications, showing 2%, interest in social and behavioral aspects of education. In-depth insights into the application of " teachers' performance and e-learning" can be reflected in the academic fields of physics and astronomy, which take up 1%, with 42 publications.

Respectively, 1% each of Materials Science, Business, Management and Accounting, and Psychology contribute modestly to the significance of integration in education based on the number of publications on this topic, which amount to 41, 40, and 37 publications, respectively.

To summarize, although much research has been conducted in the computer science and social sciences on the e-learning platforms' tools and teachers' performances via e-learning platforms, several other academic disciplines also contribute to a comprehensive understanding of this multifaceted topic.

The results of this bibliometric study show a variety of scientific works that contribute to our understanding of the relationship between the e-learning platforms' tools and teachers' performances and their impact on learning. The growing number of publications, the diversity of contributing countries and institutions, and the dominance of certain topics and keywords indicate that teachers' performance and e-learning have a

positive impact on education, particularly in terms of learning outcomes. The findings emphasize the multidisciplinary aspect of teachers' performance and e-learning research and highlight the combined efforts of academics, technologists, and professionals from different countries. This study not only provides useful insights into the current state of knowledge but also sets the framework for future applications that will have a lasting impact on educational methods and academic experiences.

Discussion

This bibliometric study on the tools available on e-learning platforms, the performance of teachers, and the impact this has on learning outcomes reflects a thorough understanding of the new trends surrounding the integration of technology in education, particularly in light of the increased demand for technology during and after the pandemic, which prevented students from physically communicating with one another and required them to collaborate with institutions to engage students and deliver learning outcomes. The results demonstrate the theme's growth and realization through a range of contributions from numerous countries and organizations, as well as its increasing significance among specialists and academic practitioners.

Trends in Publication and Geographic Distribution

Scholarly publications about the connection between instructors' performance and the resources provided by e-learning platforms have increased, especially after 2019. This indicates that scholars are paying more attention to this topic. The pattern mentioned above highlights how crucial it is to comprehend how well teachers perform and how well the technologies on e-learning platforms are used. It was probably brought on by the widespread adoption of online learning amid the COVID-19 pandemic. The important contributions to these publications from widely dispersed nations—the United States, China, India, and the United Kingdom—highlight the study's international scope. A multitude of viewpoints and insights are provided by the intriguing phenomenon of how various educational and cultural contexts have impacted the creation of e-learning platform tools and teachers' performance techniques.

Influential Journals and Educational Institutions

Leading scholarly journals and organizations that are undertaking ground-breaking research on the fusion of e-learning platforms' capabilities with instructors' performances are identified in the report. Scholars studying the results of numerous research publications in this field are discovering that this knowledge is getting more and more crucial. The importance of these academic institutions and publications also takes into account the impact of science, the ability to influence education and learning methods in the future, and the recently introduced technology.

Prolific Authors and Research Keywords

Prolific authors in the field are recognized for their accomplishments and unwavering dedication to scholarship. Their research serves as the foundation for both current knowledge and upcoming developments in the areas of e-learning and teacher performance. Additionally, the examination of keywords in original sources offers helpful insights into the complexity and diversity of the area, which includes technology, engineering education, and machine learning, among other fields. The popularity of terms

like "educational informatics" and "natural language processing systems" indicates a significant establishment of technological elements, especially when combined with terms like "students" and "education," which emphasize and promote the human and pedagogical dimensions of learning.

Subject Areas and Their Implications

The study highlights how interdisciplinary machine learning is and covers a wide range of topics. The convergence of engineering, educational theory, and mathematical decision theory to analyze the subjects of study is demonstrated by the rise of computer science and the social sciences. To create engaging and productive learning environments that integrate a range of technology and teaching techniques, an interdisciplinary approach is essential. In summary, this bibliometric analysis's findings offer a thorough overview of the present and future directions of scholarly inquiry into the effects of integrating the tools of e-learning platforms with instructors' performances on student learning and academic outcomes. This expanding corpus of work is important for achieving academic objectives as well as being useful for practitioners, educators, and technologists. Educators must stay up to date on the most recent advancements in machine learning to guarantee that digital learning environments are effective, inclusive, and conducive to learning outcomes.

Conclusion

The dynamic relationship between teachers' performances and the resources available on e-learning platforms is thoroughly examined by the bibliometric analysis carried out in this work. It demonstrates the notable rise in scholarly study in this field and the growing significance of machine learning in contemporary education. The fact that specific themes and phrases are frequently used, together with the variety of countries and organizations that contribute, demonstrates how international and interdisciplinary machine learning research is. Together with shedding light on the state of research today, the global partnership of scholars, technologists, and researchers has also set the groundwork for future investigations. This emphasizes the significance of conducting additional research on the caliber of results from the instruments of e-learning platforms and the performance applications used by teachers that are combined into distinctive. Ongoing research is crucial for influencing educational methods and improving learning experiences in the context of digital platforms and applications.

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