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Knowledge Sharing and Students' Development: R- Based Bibliometric Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

With a focus on bibliometric analysis, this study intends to analyze the patterns in the literature regarding knowledge sharing and student development. To find studies that were specifically focused on the topic under research, the authors searched Scopus using the Boolean operators

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AND, OR and NOT, together with the terms "knowledge sharing" and "student development," as well as their synonyms. In general, the study did not take the publication date into account. There were 1,154 documents in total in the final data set. The data were analyzed using Biblioshiny and VOSviewer software based on R. The use of bibliometric analysis to examine the connection between knowledge sharing and student development revealed several themes, influential authors, highly cited papers, prominent organizations and powerful nations. In addition, the study showed how the relationship between knowledge sharing and student development has changed over time and how it may interact with student performance to give educational institutions a long-term competitive advantage. To the author's knowledge, this study is the first to conduct a bibliometric analysis on knowledge sharing and student development. This study can be a starting point for scholars interested in understanding how knowledge sharing can relate to student development.

Keywords: Knowledge sharing; student development; scopus; bibliometric analysis; biblioshiny.

1. INTRODUCTION

The methods of knowledge management, often known as KM, are essential and necessary for organizations [1]. It has been said that KM is a "systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees that other employees may make use of to be more effective and productive in their work [2,3]". According to Claver-Cortés et al. [4], it is a dynamic and continuous social process that generates, disseminates and uses knowledge inside an organization [5].

Knowledge sharing (KS) is necessary for developing education, research and innovative practices in higher education. The potential for knowledge sharing has risen dramatically in recent years due to the fast expansion of information and communication technology, which has led to a rising acknowledgement of its value in the academic community [6,7,8]. Despite this acknowledgement, there is still much to learn about the nature of academic information sharing and its impact. Understanding how information is shared, what variables enable or impede knowledge sharing and the influence of knowledge sharing on academic progress are vital areas of investigation that guide policies and practices that are aimed at fostering successful knowledge sharing in higher education.

This study examines past-future perspectives in knowledge sharing and academic development research. This research uses bibliometric analysis performed with the R-based biblioshiny program and VOSviewer to offer the intellectual framework for sketching and capturing the contents of published research papers systematically and objectively. The bibliometric analysis illuminates' elements that boost research contributions and guide researchers to influence research [9,1]. This study is essential and gives a magnificent view of the researched area literature, which beginner scholars and KS researchers may use as a reference. This study's knowledge-sharing research will help scientists comprehend KS research. This analysis will help future KS scholars discover significant works, authors, journals, publishing and cooperation patterns and intellectual structure. This analysis will assist academics in identifying gaps and potential research topics. Finally, this study will help practitioners identify significant KS areas for effective knowledge sharing in higher education.

In order to provide a theoretical framework that would aid in understanding the elements that drive knowledge sharing in academic contexts, the study intends to analyze the current literature and research on knowledge sharing and academic growth using biblioshiny and R-based software.

The application of bibliometric analysis to the investigation of the existing literature on sharing knowledge for academic progress is this work's original and innovative aspect. There need to be more studies done on knowledge sharing in the context of academic advancement. However, earlier studies have examined the elements that influence knowledge sharing and its impact on organizational success. This study offers an overview of the research trends, significant issues and knowledge gaps in this domain by conducting a bibliometric analysis of the relevant literature. This analysis will be done in order to present this overview. Because of this, academics and practitioners will be able to determine the works that have had the most impact and develop patterns and potential future research areas for knowledge exchange in academic progress.

2. LITERATURE REVIEW

By "mutually exchanging knowledge (implicit and explicit) and jointly creating new knowledge" [10], KS allows for the assimilation of ideas from various personnel within an organization [11]. Knowledge may be passed down in one of two ways: verbally (through tacit knowledge) or in writing (by explicit knowledge) [12]. Although face-to-face communication is the most common mode of disseminating tacit knowledge [13], training, conferences, informal social networks and member interactions are equally effective [14]. Cavaliere and Lombardi [15] note that KS has two aspects, knowledge giving (when individuals voluntarily share information with others) and knowledge collecting (when people draw on the expertise of their coworkers) [16]. Interpersonal trust positively enhanced knowledge sharing and collection. Trust also impacts resource interchange and production innovation. It also affected knowledge collecting more than giving. Because of its effect on the norms and values associated with information sharing, organizational culture is essential in knowledge sharing. An organization will likely have more excellent knowledge-sharing activities if the way of the organization encourages the free following of information [17,18].

Farooq [19] created a study that mapped the knowledge management field. Six hundred sixty-nine papers published between 1997 and 2021 were analyzed using bibliometric methods for this study. In this research, the R software program was employed for both performance analysis and scientific article mapping. The data demonstrate that the number of articles published in the JKM over time rose dramatically, indicating a rising academic interest. This analysis sheds light on promising new areas of inquiry, such as change management, change preparation, product innovation, and digital libraries.

Regarding citations, the United States and the United Kingdom were the most productive countries, followed by a few European countries such as Spain, Finland, Germany, and Sweden. Similarly, a bibliometric analysis of social media content dissemination from 2009 to 2020 was undertaken by Abbas et al. [20]. The findings from the research on the effects of knowledge sharing via social media are striking. In addition, an exciting study by Goswami & Agrawal [1] showed knowledge-sharing research patterns and trends. The study concluded that the field of KS research is dynamic and extremely promising for future development. Furthermore, it thoroughly analyses the KS research literature, highlighting the works, authors, and journals that have had the most profound theoretical impact. Several studies have been conducted up to this point that attempt to extrapolate the growth patterns and intellectual framework of KM and KS investigations [1,19,21-32], however, to the author's best understanding and conviction, no such study exists in the literature concerning the function of KS in the maturation of pupils.

For the sake of our examination of KS and academic development research, we have devised the following research questions to serve as a guide: Who are the authors who have had the most impact in terms of the number of citations and documents published? Which organization is influential? Which patterns of publishing are now seen in research? What are the current trends in the work done collaboratively on KS research? Finally, what is the intellectual framework of KS research?

2.1 Theoretical Framework

Social network theory uses degree, betweenness, and proximity to uncover opinion leaders' advantages [33]. Degree centrality assesses a network's linkages to and from a person. Opinion leaders are likelier to have high social centrality because they can acquire and share information. The degree to which a node appears on the shortest path in a network is quantified by a concept called "betweenness centrality." Bridges-nodes that connect otherwise disconnected network clusters are more likely to be betweenness central. Like gatekeepers, high-betweenness centrality persons can block the spread of an idea. Finally, proximity centrality estimates the average distance between a node and all other nodes. Higher proximity centrality means fewer steps to reach all network members and quicker information transfer. Influential people with strong proximity centrality can reach other network contacts [34].

The idea of social network theory serves as the foundation for this investigation's theoretical framework. This theory may be utilized to get an understanding of the process by which academic communities communicate and share knowledge via the usage of social networks. According to the social network theory, individuals and organizations are embedded inside social

networks, influencing their actions, decisions, and access to resources. In the context of academic progress and the sharing of knowledge, social network theory can be utilized to map and analyze the relationships between researchers, institutions, and other stakeholders; in addition, it can be used to identify critical actors and brokers who facilitate knowledge transfer and collaboration [35].

3. METHODOLOGY

The bibliometric approach [36] was employed to create a scientific map of the field of equal opportunity in knowledge sharing and academic development. According to Avelar et al. [37], bibliometric analyses make it possible to characterize scholars working on a subject as well as the links between those researchers, which in turn helps researchers contribute to the field. This bibliometric study retrieved all documents related to knowledge sharing and students' development indexed in Scopus on April 25, 2023. Scopus, the largest abstract indexing database, can help researchers not miss key papers [8,38]. This database includes large areas of topics and offers complex search capabilities to assist researchers in creating reliable search strings, especially in broad domains [20].

The following search terms (Fig. 1) were considered to search Scopus: (TITLE (knowledge AND sharing) OR TITLE (information AND sharing) OR TITLE (knowledge AND transfer) AND TITLE (students AND development) OR TITLE (academic AND success) OR TITLE (learning)) AND (LIMIT-TO (LANGUAGE," English")). One thousand one hundred fifty-four documents were found on April 25, 2023. The following Fig. shows the search key terms:

When we searched (search process Fig. 2) the Scopus database through a title search, 1154 documents appeared. For exploring the documents, a title search was considered. All publications were considered irrespective of articles, reviews, conference papers, book chapters, reviews, notes, etc. In this study data set, 53.1% are article papers, and 38% are conference papers (Fig. 4). The documents were found from 1967 to 2023. 2022 (Fig. 3) was the most influential year for the publication of the searched items.

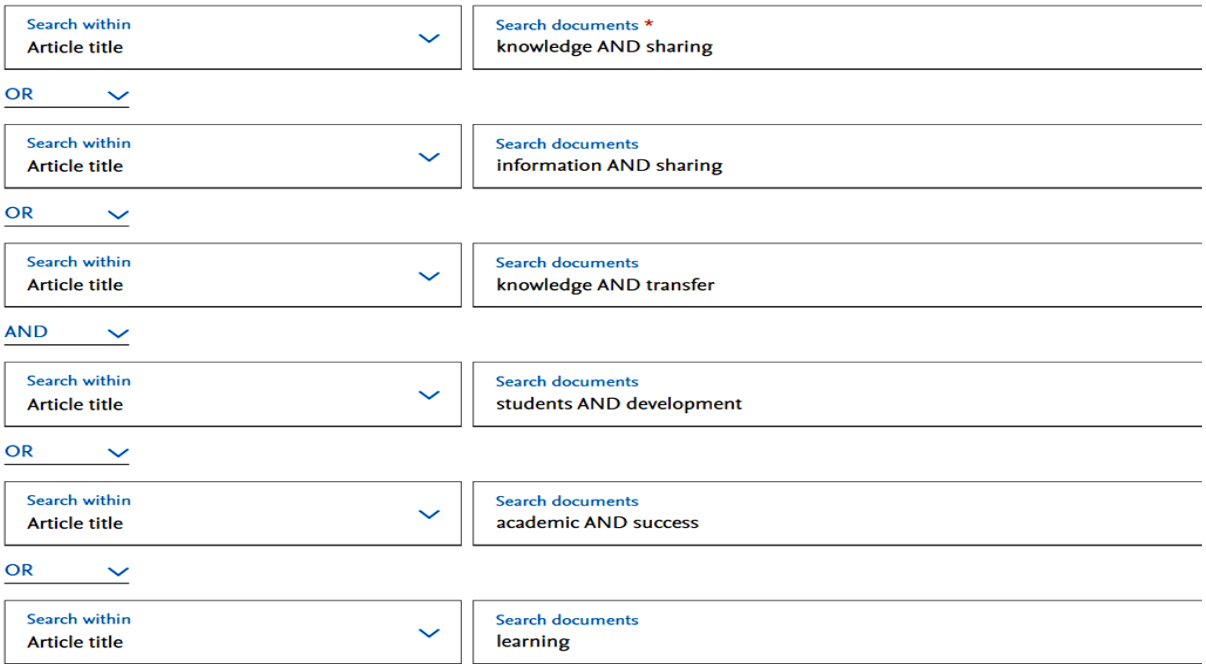

Fig. 1. Search key terms

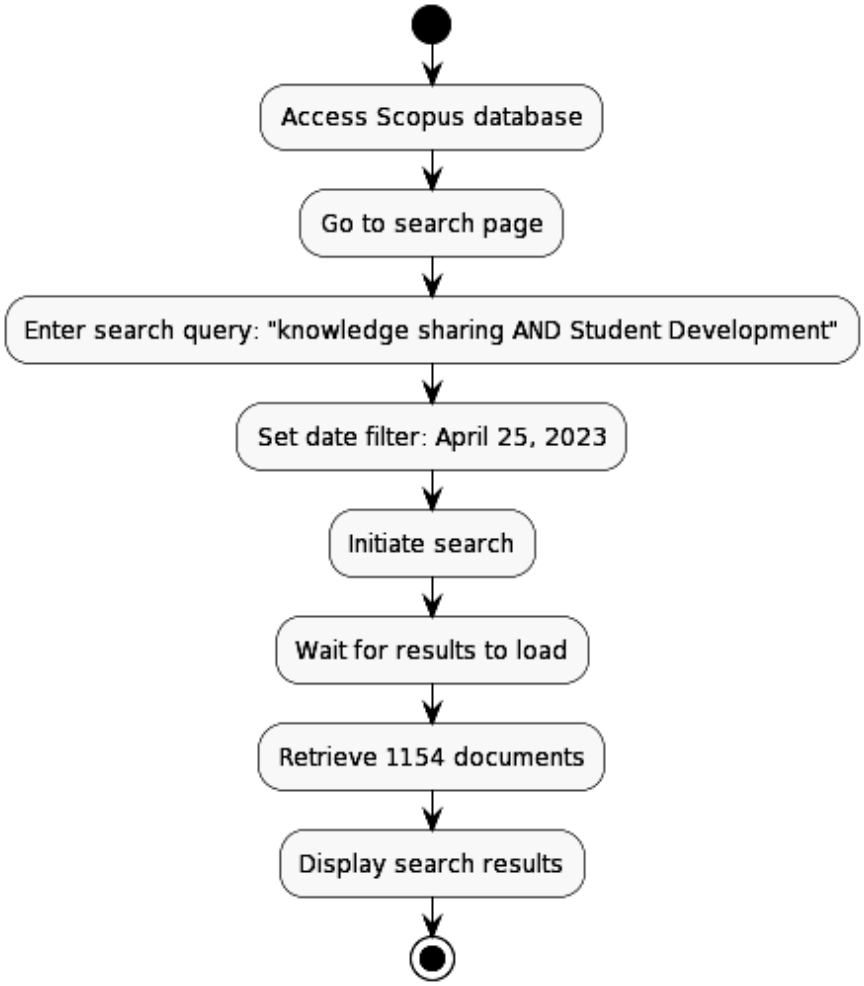

Fig. 1. Search process

The data are put through a performance analysis and science mapping for the study. Performance analysis has employed the most cited nations, affiliations, authors, and keywords, as agreed by Gaviria-Marin et al. [26]. Most cited documents, author influence, and annual total citations. R software analyzed the scientific mapping. CitNet Explorer, VOSviewer, SciMAT, and CiteSpace [39,19] are among many software programs offering bibliometric analysis. R package allows quantitative, bibliometric, and scientometric research, unlike other tools. The open-source packages bibliometric and biblioshiny are utilized in the R programming language context. Bibliometrix makes it possible to finish analyzing scientific publications and processing data. According to Aria and Cuccurullo [40], Biblioshiny is a programme that recreates the fundamental bibliometric code as an online data analysis platform. Users are given the ability to do relevant bibliometric and visual analysis based on an interactive online interface through the usage of Biblioshiny [41]. The missing data table (Table 1) shows whether any parameters of bibliographic items are missed after the retrieval of data from the Scopus database.

4. DATA ANALYSIS

The number of articles they have written and the degree of fractionalization of those articles may be used to determine which authors in document publishing are the most influential, and it is given in (Table 2) and (Fig. 5). Wang Y has written the most publications (12) and has a high fractionalization rate (3.17), demonstrating a significant impact on the publications. Li X and Wang Z are tied for the second largest number of papers published (11), while Li X has the most excellent fractionalization rate (3.27) compared to Wang Z's close second (3.08). The significance of an author's work cannot, and it is

vital to remember, be gauged only by the number of articles that are published or the fractionalization rate. It is also necessary to consider other elements, such as the caliber of the study, the number of citations, and the impact factor of the journals where the papers were published.

Additionally, it is critical to understand how co-authorship and cooperation may significantly impact an author's influence. For example, an author may have fewer publications or a lower fractionalization rate but may have worked closely with prominent writers and contributed significantly to their work. A more thorough examination is required to ascertain the whole level of an author's influence in their area, even though the offered statistics might reveal insights into the most prolific writers in document publications.

Table 1. Missing data table

Metadata	Description	Missing Counts	Missing %	Status
AB	Abstract	0	0.00	Excellent
DT	Document Type	0	0.00	Excellent
SO	Journal	0	0.00	Excellent
LA	Language	0	0.00	Excellent
PY	Publication Year	0	0.00	Excellent
TI	Title	0	0.00	Excellent
TC	Total Citation	0	0.00	Excellent
AU	Author	16	1.39	Good
C1	Affiliation	24	2.08	Good
CR	Cited References	37	3.21	Good
DI	DOI	189	16.38	Acceptable
DE	Keywords	305	26.43	Poor
RP	Corresponding Author	419	36.31	Poor
ID	Keywords Plus	1154	100.00	Completely missing
NR	Number of Cited References	1154	100.00	Completely missing
WC	Science Categories	1154	100.00	Completely missing

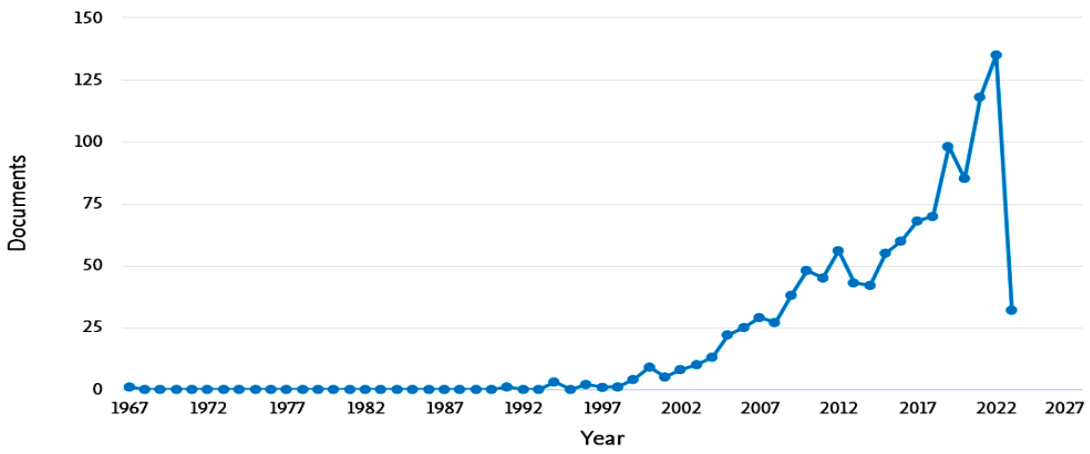

Fig. 2. Documents by year

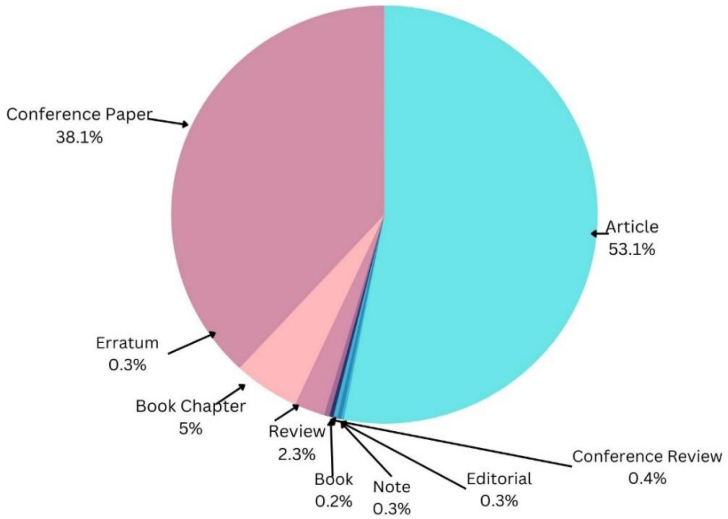

Fig. 4. Document by type

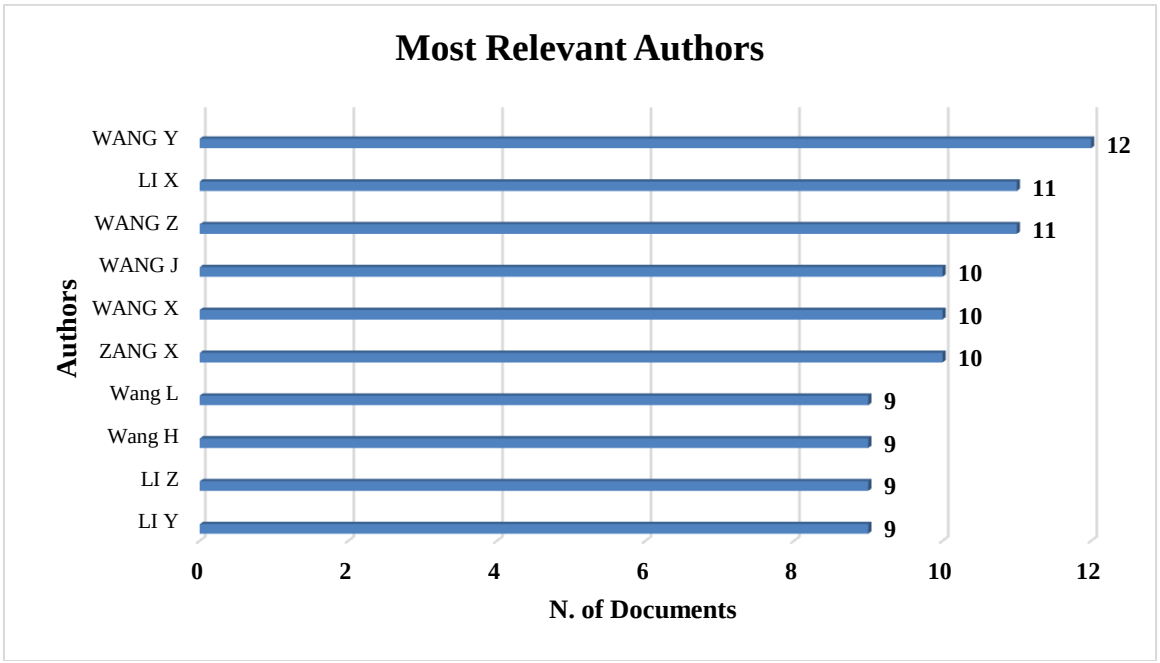

Fig. 5. Most relevant authors

Table 2. Most relevant author

Authors	Articles	Articles Fractionalized
Wang Y	12	3.17
Li X	11	3.27
Wang Z	11	3.08
Wang J	10	2.84
Wang X	10	2.84
Zhang X	10	2.08
Li Y	9	2.82
Li Z	9	1.89
Wang H	9	2.74
Wang L	9	3.15

4.1 Authors' Productivity through Lotka's Law

Lotka's bibliometric law describes the correlation between the number of writers working on a topic and the output (in terms of articles) in that field. It is predicated on the idea that a small group of highly prolific authors will contribute a substantial fraction of the published papers. This formula can be used to represent Lotka's law. According to Fig. 6, 2513 (87.1%) authors, each merely a single article, 248 authors, or 8.6%, published two papers, 63 authors (2.2%), on average. Twenty-nine authors (1%) authored four publications apiece. Nine writers published five papers each (0.3%), each author of six papers authored five (0.2%), and each of the three writers wrote seven and eight (0.1%); five writers produced nine publications apiece (0.2%). Two writers each authored 11 publications (0.1%). Published eleven papers, of which one person (or 1% of authors) published twelve or more. Overall, Lotka's law states that the great majority of publications in an area will be produced by a small number of highly prolific writers. In contrast, the vast majority of authors will only produce a tiny number of papers apiece.

4.2 Most Globally Cited Documents

Table 3 and Fig. 7 detail the total number of citations, the total number of citations per year, and the total number of normalized citations for ten works. The 2017 work by Yim J has the most citations overall (751), demonstrating that it has been widely referenced in the scholarly literature.

Yim J's article has a total citations per year of 107.29 and a normalized total citation count of 27, which is higher than several other publications, demonstrating that it has had a long-lasting influence. This can result from the paper's significant results or applicability to current study areas. The 2003 work by Song J has a total citation of 624 and a citation rate per year of 29.71.

The table summarizes the influence and effect of many academic works, emphasizing the variety of elements affecting a paper's citation count and sustained impact over time.

4.3 Author Collaboration Network

The provided data in Table 4 shows an author collaboration network with nodes representing authors and several measurements, such as betweenness, closeness, and PageRank, indicating various network properties. The authors are broken up into groups with numbers ranging from 1 to 12. Betweenness measures how often a node appears on the shortest path connecting two other network nodes. The degree to which a node can reach every other node in the network is referred to as proximity. PageRank calculates its relevance based on the volume of links pointing at a node. We can observe from the data that there are four main clusters, each with authors with high ratings for betweenness, proximity, and PageRank. These writers most likely serve as the network's hub and contribute significantly to collaboration. The writers in Clusters 1 and 3 had the most excellent betweenness ratings, indicating they are significant bridges between various author groups in the network. The authors in Cluster 4 are the most significant and influential in the network based on their high PageRank ratings. The authors in the other clusters are less critical of the network, as seen by the lower ratings of these clusters. They continue to assist in joining various portions of the network, nevertheless. Overall, this network of cooperation emphasizes the significance of specific writers within it and how their traits influence the collaborative process. It offers information on the collaboration between authors and the possible effects of individual authors on the network as a whole.

4.4 Most Relevant Sources

There is a list of publication sources and the total number of works appearing in each venue (table 5, Fig. 8). The computer science subfields covered by the Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics series of books. In all, this publication has 44 articles.

Most publications have a tie with 12 between the Learning Organisation, the Proceedings of the European Conference on Knowledge Management (ECKM), and the International Joint Conference on Artificial Intelligence (IJCAI). Eleven articles were published in Communications in Computer and Information Science and ten in the Journal of Knowledge Management. This data may be used by academics and professionals in computer science and related fields to locate relevant resources and learn more about related topics. The list summarizes numerous publication sources and includes data on how many

individual papers can be found. Artificial intelligence, knowledge management, computer vision and pattern recognition, engineering, and technology are only a few of the topics covered by these books and journals.

4.5 Most Cited Country

A country's scholars' citations represent their academic importance. The research's influence and relevance to other academics increase with citations. This data can help academics and practitioners discover their field's most significant countries and researchers and understand current trends. According to Fig. 9, USA is the most cited country with 3099 citations and an average of 31.30 per document, followed by China with 2477 citations and 13.50 per document and the UK with 832 citations and 21.30 per document. Korea, with 752 citations, averages 50.10 per document. Fig. 10 shows the corresponding authors' countries. Various data show the impact of research in various countries. The USA, China, UK, and others have more and average citations, indicating that their scholars are influential. Other nations may have fewer citations because their research needs to be more well-known or focuses on internal challenges rather than international cooperation.

Fig. 10 shows the corresponding authors' countries. China has the most corresponding authors, with over 150 documents, indicating that Chinese scholars publish and collaborate with others. This number of corresponding authors also shows that China supports and funds research, allowing scholars to publish globally. The US, a global leader in research and innovation, has 100 corresponding authors in academic research and cooperation. Despite their academic renown, Germany and the UK have fewer corresponding authors, suggesting they may focus more on local research

On the other hand, India, Malaysia, Australia, and Canada had fewer corresponding authors, suggesting they may have more excellent financing, resources, and international collaboration issues. These nations may have smaller research communities or focus on other research fields. Therefore, this does not always represent their research quality or influence. Overall, the number of associated authors from each nation shows the strengths and problems of academic scholars worldwide

4.6 Country Scientific Production

The top 10 nations are listed (Fig. 11) according to the number of publications, with China leading the list with 848 publications. With 557 publications, the USA comes in second, followed by the UK with 192 publications. With 181, 138, and 129 publications, Germany, Australia, and Malaysia account for a sizable share of the publications. The following four countries in the list, with 113, 90, 80, and 70 publications each, are Canada, Japan, Italy, and India. It is important to remember that the number of publications from a particular nation only sometimes reflects the caliber or significance of the research conducted there. However, recognizing research trends and international partnerships may be done using this information. Additionally, it emphasizes the significance of resources and financing for research and development because nations that invest more in these fields tend to create more publications.

Documents written	N. of Authors	Proportion of Authors
1	2513	0.871
2	248	0.086
3	63	0.022
4	29	0.01
5	9	0.003
6	5	0.002
7	3	0.001
8	3	0.001
9	5	0.002
10	3	0.001
11	2	0.001
12	1	0

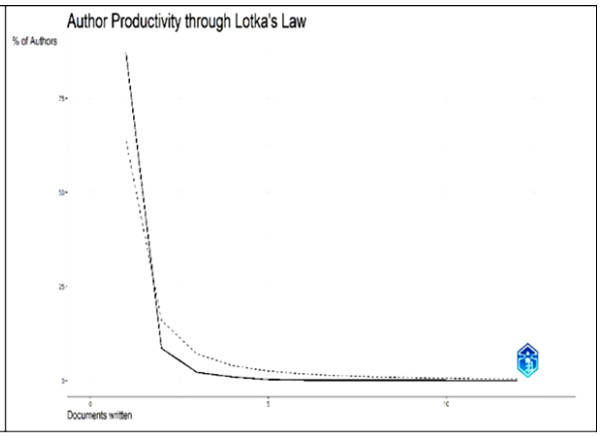

Fig. 6. Lotka's Law

Table 3. Most globally cited documents

Author	Documents	Citations	Norm. citations	Avg. pub. year	Avg. citations	Avg. norm. citations
Yim J.; Joo D.; Bae J.; Kim J.	1	751	27.7694	2017	751	27.7694
Song J.; Almeida P.; Wu G.	1	624	6.4396	2003	624	6.4396
Capello R.	1	430	2.7044	1999	430	2.7044
Muthusamy SK; White M.A.	1	375	13.9594	2005	375	13.9594
Lord M.D.; Ranft A.L.	1	264	3.9732	2000	264	3.9732
Tommasi T.; Orabona F.; Caputo B.	2	253	13.1459	2012	126.5	6.5729
Vapnik V.; Izmailov R.	2	250	12.3318	2015	125	6.1659
Gregan-Paxton J.; John D.R.	1	243	1	1997	243	1
Rohrbach M.; Stark M.; Schiele B.	1	224	9.9703	2011	224	9.9703
Yang J.-T.	2	208	10.0959	2008	104	5.0479

4.7 Most Relevant Affiliations

Fig. 12 list the top ten institutions according to the number of articles they have in a particular dataset. With 24 publications, Peking University in China has the most, demonstrating its position as a top university. The second most significant number of publications, 18 from the Beijing University of Posts and Telecommunications and Xi'an Jiaotong University in China, shows these universities' importance in the discipline. Compared to the other universities on the list, Ahlia University has a comparatively high number of publications-15. This might mean it has a very productive research group or is a prominent institution in a particular discipline. Shenzhen University, Tsinghua University, and Northwestern Polytechnical University each had 14 and 13 publications. Although slightly less active than the top universities, these institutions are crucial in the subject.

Compared to the other universities on the list, Multimedia University and the University of British Columbia have 12 publications, which is a high number. This implies they are engaged in the subject and conducting the critical study. With a focus on the top institutions and their contributions to the research literature, the table offers data on various institutions' degrees of activity and influence. However, it is crucial to remember that the quality and importance of the research should also be considered since the number of publications may be one of the many reliable indicators of an institution's effect.

4.8 Three Field Plot

In bibliometrics, a three-field plot visually represents the connections between several scientific topics. It is a scatter plot with three axes, each representing a different bibliometric indicator. Using the three-field plot, researchers can compare and analyze the performance of various scientific subjects based on these bibliometric markers. This type of data visualization makes it feasible to spot domains that are both very active and low impact (low average citation rate), highly impactful but low activity (a large number of publications), and doing well on both measures. For example, Fig. 13 shows that knowledge transfer, transfer learning, and knowledge sharing significantly impact the plot. Because it enables decision-makers to pinpoint areas of study that are underfunded but have a high potential for effect and to assess the success of various disciplines over time, this plot is very helpful for research policy and financing choices.

4.9 Keyword Map

The paper's essential ideas are reflected in its keywords, selected words, or phrases. The popularity of a topic in the field of study may be gauged by looking at search terms. Trends in the field of study might be reflected in the selection of new keywords [42]. In the keyword data, topic occurrences and average citations vary. According to Fig. 14 and Table 6, "Knowledge Sharing" and "Knowledge Transfer" occur 172 times. This shows that researchers value both issues equally. "Transfer Learning" appears 91 times. The average citation count shows that it receives significant scholarly attention despite its rarity. Researchers have recognized the importance of using knowledge from one domain to improve learning in another. Research literature covers "Knowledge Management" with a high recurrence count of 50. "Learning" is essential to the field. Its high average citation count shows its prominence and influence on 44 occurrences. "E-Learning" appears 42 times. As a unique learning topic, E-learning has attracted significant scholarly attention and citation. "Organisational Learning" occurs 41 times. This shows how organizations acquire and use knowledge is a popular management research topic. "Deep Learning" appears 30 times. The average citation count shows that machine learning and artificial intelligence is a fast-growing area. Reinforcement Learning: 28 occurrences show its learning relevance. The average citation count implies it has influenced studies on how agents learn from their surroundings. "Machine Learning" appears 22 times. As a primary field in artificial intelligence, it has been extensively investigated. However, the lower average citation count may reflect a more excellent range of subtopics and more study fragmentation. The statistics show keyword incidence and citation patterns.

The keyword "Knowledge Sharing" appears 172 times. This implies that researchers value knowledge sharing in learning and development. Sharing knowledge, ideas, and expertise improves students' learning experiences. Moreover, "E-Learning" appears 42 times. This shows that digital technology and online platforms for knowledge sharing and learning are popular. Students use e-learning to access resources, collaborate with peers, and learn

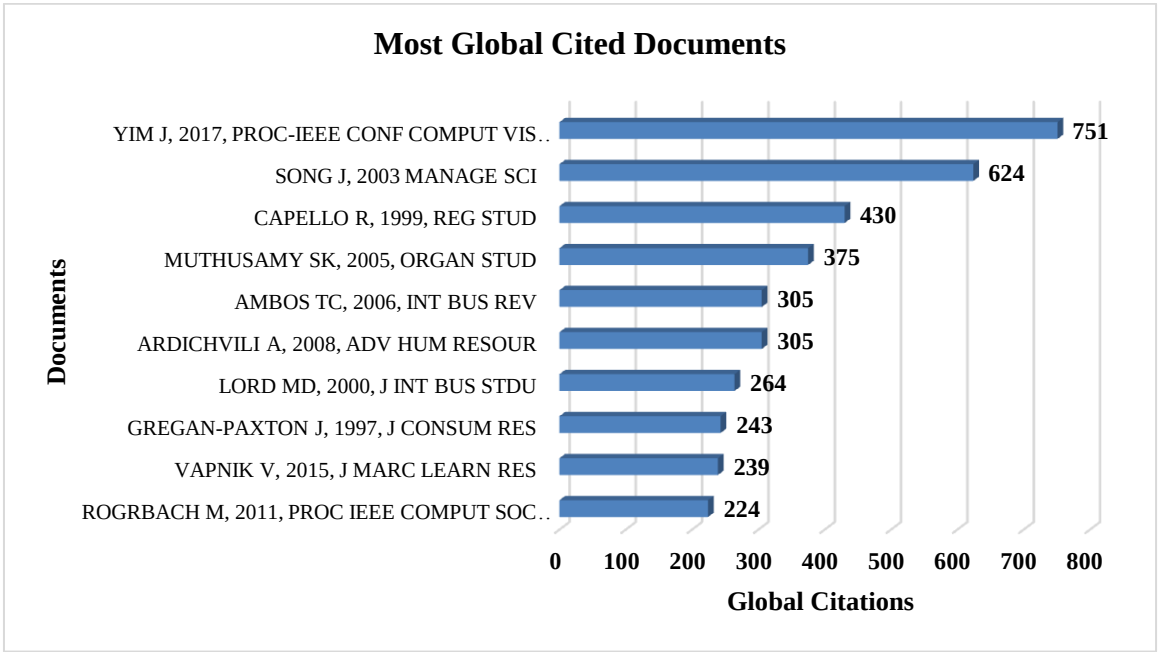

Fig. 7. Most globally cited documents

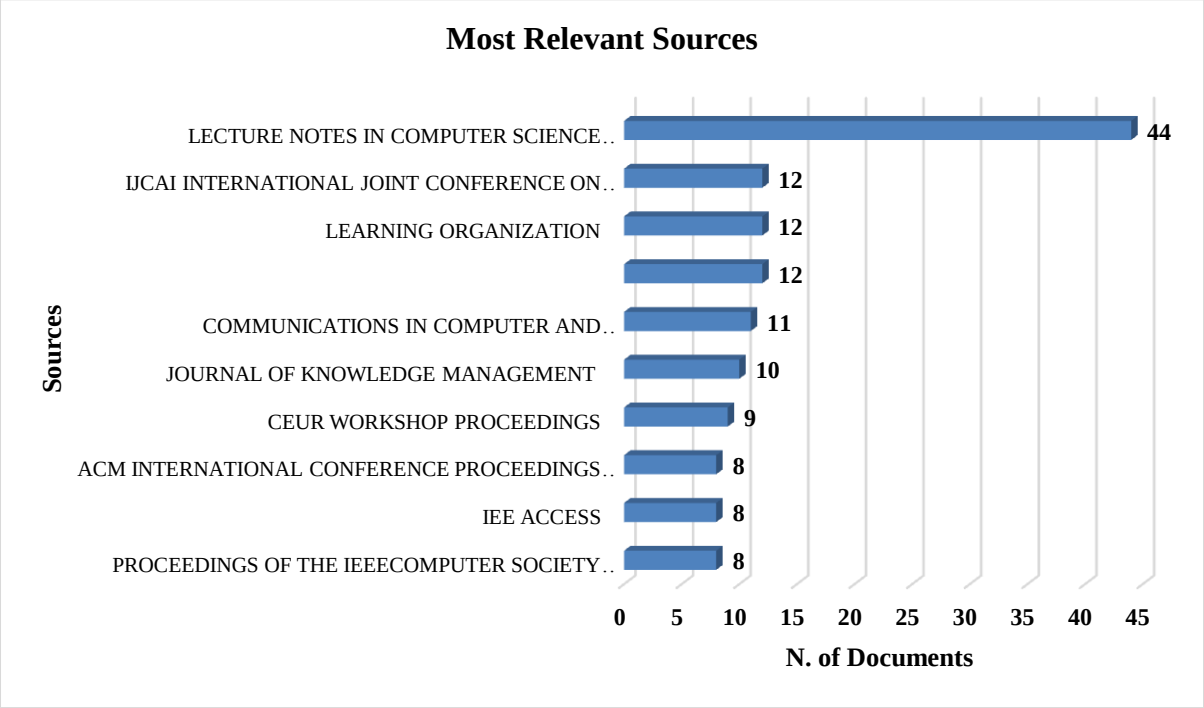

Fig. 8. Most relevant sources

interactively. In addition, "Organisational Learning" appears 41 times. This keyword is mostly connected to organizational knowledge exchange, but it also applies to education. Creating a continuous learning and knowledge distribution culture helps improve students' learning and growth. In addition, collaborative learning and knowledge sharing can improve student learning. Overall, "Knowledge Sharing" and "E-Learning" keywords have garnered attention in learning and development. They emphasize the necessity of sharing knowledge through numerous channels, including digital platforms, and collaborative learning and organizational practices in improving students' educational journeys.

Table 4. Author collaboration network

Node	Cluster	Betweenness	Closeness	PageRank
Wang H	1	131.6459207	0.011363636	0.044023347
Wang L	1	82.90354809	0.010869565	0.030129911
Liu B	1	0	0.0078125	0.007566851
Liu H	1	0	0.008695652	0.011407543
Shen J	1	0	0.00877193	0.011835255
Chen J	2	46.06384286	0.009090909	0.021907108
Li M	2	0	0.006666667	0.008064351
Wang Y	3	81.81383551	0.010526316	0.036076833
Zhang X	3	62.84251108	0.010989011	0.039127943
Li Y	3	57.38383838	0.00990099	0.033722327
Chen C	3	11.55	0.01	0.017610175
Wang C	3	33.2559413	0.010869565	0.033738413
Zhang Z	3	5.611111111	0.008695652	0.011064253
Guo J	3	29.21924905	0.010869565	0.02766106
Wang Z	4	66.78368021	0.011494253	0.032300041
Wang J	4	35.55143583	0.010989011	0.027594217
Wang X	4	31.07700116	0.010638298	0.033956076
Li Z	4	99.01445738	0.011627907	0.04257198
Li J	4	2.252777778	0.009708738	0.016926916
Zhang L	4	56.8821831	0.011627907	0.035469009
Wang S	4	58.24204967	0.011363636	0.038178757
Zhu Y	4	49.15911508	0.011627907	0.034390187
Zhang H	4	28.97214893	0.010989011	0.021447674
Zhang J	4	61.4969315	0.011627907	0.029106914
Zhang W	4	5.814285714	0.00877193	0.017154371
Song J	4	11.24093799	0.010309278	0.020476785
Li X	5	17.9452381	0.009433962	0.018554349
Chen H	5	31.94351769	0.00952381	0.023415459
Xu W	5	10.08253968	0.009345794	0.01508189
Chen Z	5	5.5	0.00877193	0.014622171
Zhang C	6	59.46499334	0.010752688	0.036491741
Wu B	6	2.166666667	0.008	0.014244774
Yang Q	6	0	0.008264463	0.010181408
Huang J	6	0	0.009009009	0.01339038
Razzaque A	7	0	1	0.022727273
Reyad S	7	0	1	0.022727273
Jin Y	8	5.935714286	0.008547009	0.011851312
Liu X	8	14.42301587	0.009345794	0.015121624
Zhang Y	9	81.40353813	0.011111111	0.031629225
Wu D	9	51.87615565	0.010638298	0.026978816
Jiang Y	9	7.481818182	0.009433962	0.01756217
Liu Z	10	0	0.007092199	0.006992088
Lu Z	11	0	0.007575758	0.007677495
Wang T	12	0	0.007407407	0.007242254

Table 5. Most relevant sources

Sources	Articles
Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	44
IJCAI International Joint Conference On Artificial Intelligence	12
Learning Organization	12
Proceedings of the European Conference on Knowledge Management, ECKM	12
Communications in Computer and Information Science	11
Journal of Knowledge Management	10
Ceur Workshop Proceedings	9
ACM International Conference Proceeding Series	8
IEEE Access	8
Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition	8

Table 6. Top 10 keyword occurrences

Keywords	Cluster	Links	Total link strength	Occurrences	Avg. pub. year	Avg. citations	Avg. norm. citations
Knowledge Sharing	15	514	670	172	2015.942	17.3314	1.2433
Knowledge Transfer	9	584	711	172	2015.599	19.5465	0.9255
Transfer Learning	14	293	355	91	2019.385	9.6923	1.2711
Knowledge Management	62	165	211	50	2012.82	19.62	0.931
Learning	56	166	199	44	2015.273	19.5227	0.8625
E-Learning	44	132	169	42	2013.929	6.4762	0.4446
Organizational Learning	36	119	150	41	2014.049	28.0732	1.5165
Deep Learning	27	101	122	30	2020.533	10.7	1.229
Reinforcement Learning	14	71	95	28	2017.929	6.6429	0.5032
Machine Learning	24	70	78	22	2018.818	6.5455	0.5363

Country	Total citations	Average Article Citations
USA	3099	31.30
CHINA	2477	13.50
UNITED KINGDOM	832	21.30
KOREA	752	50.10
MALAYSIA	521	20.80
AUSTRALIA	439	19.10
CANADA	424	21.20
GERMANY	349	8.70
NETHERLANDS	337	30.60
HONG KONG	288	24.00

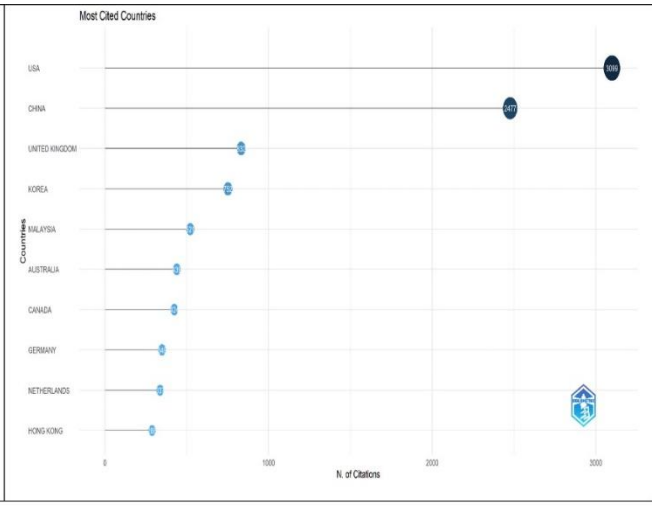

Fig. 9. Most cited country

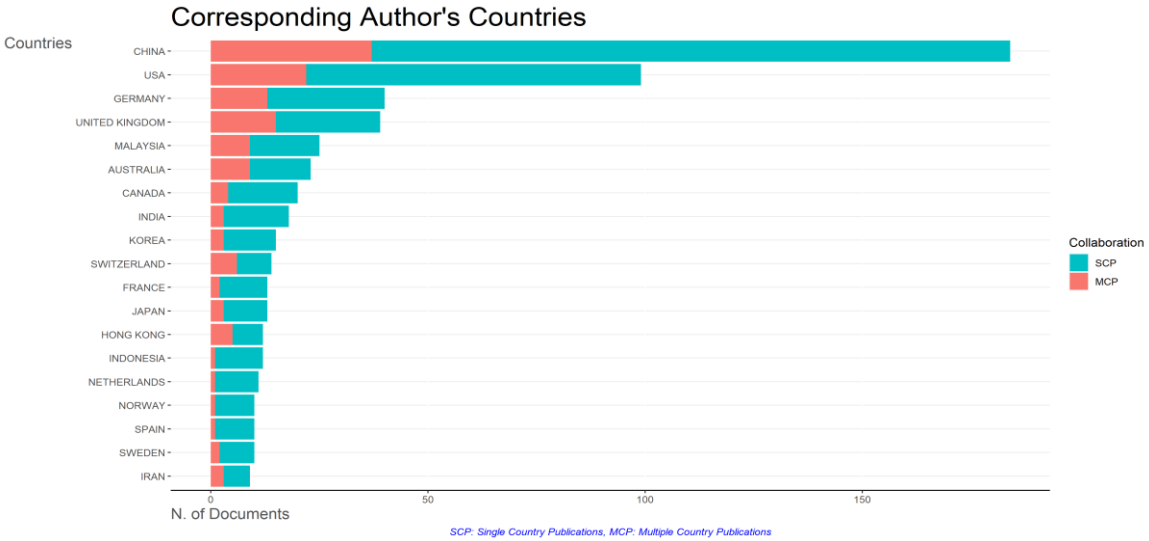

Fig. 10. Corresponding Author's Countries

Region	Frequency
China	848
USA	557
UK	192
Germany	181
Australia	138
Malaysia	129
Canada	113
Japan	90
Italy	80
India	70

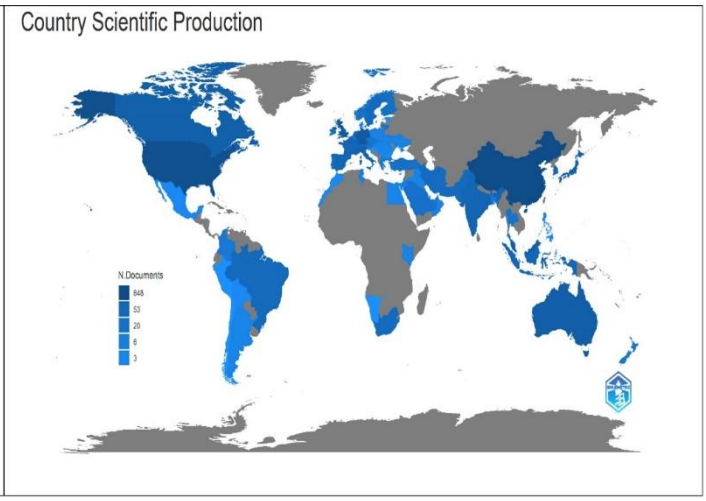

Fig. 11. Country collaboration map

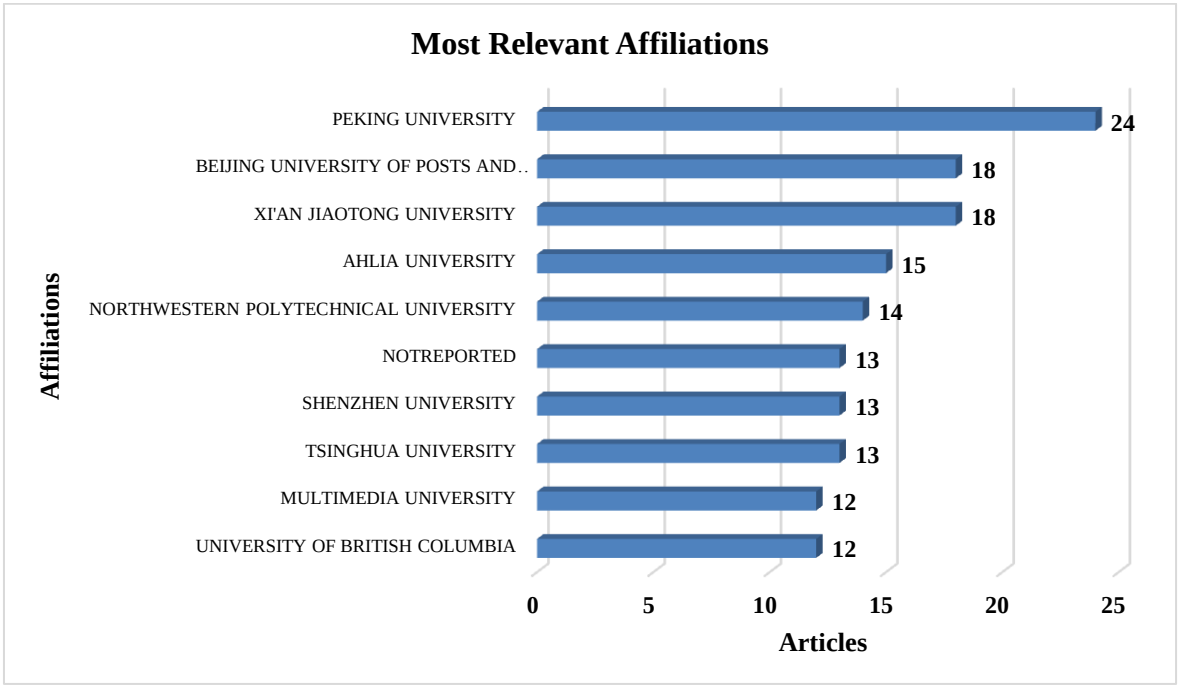

Fig. 12. Most relevant affiliations

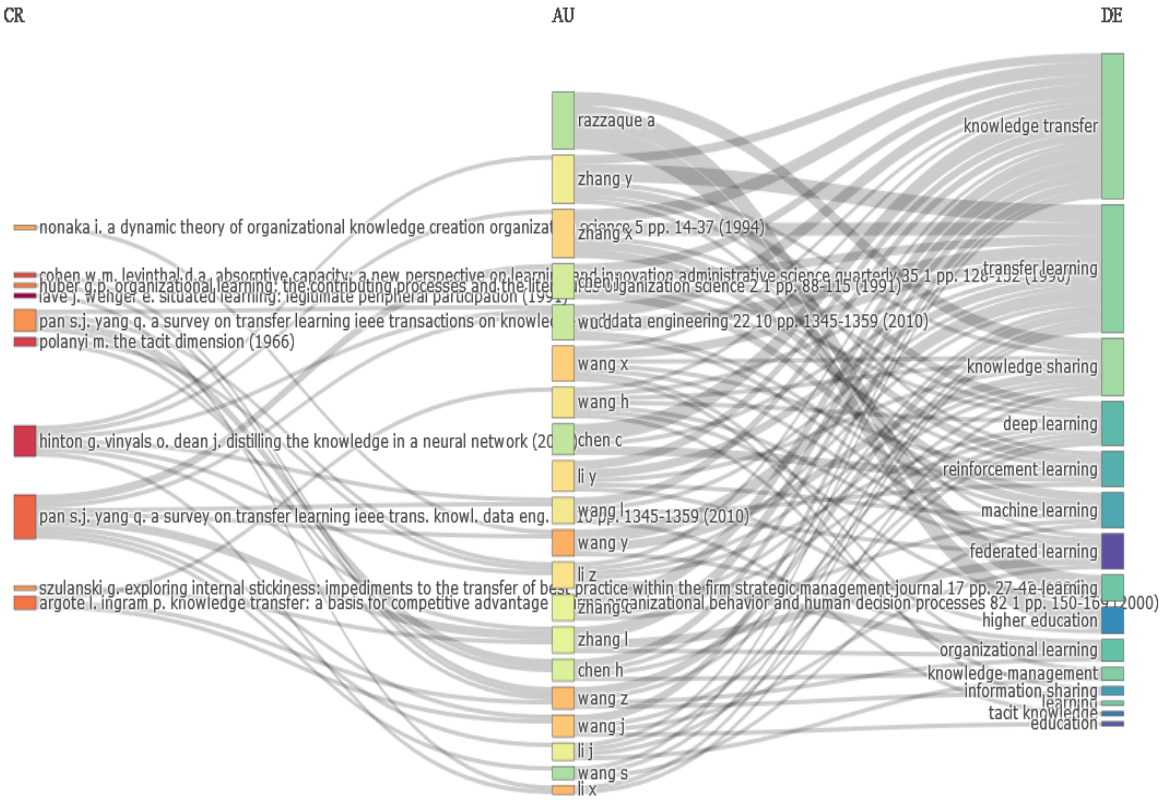

Fig. 13. Three field plot

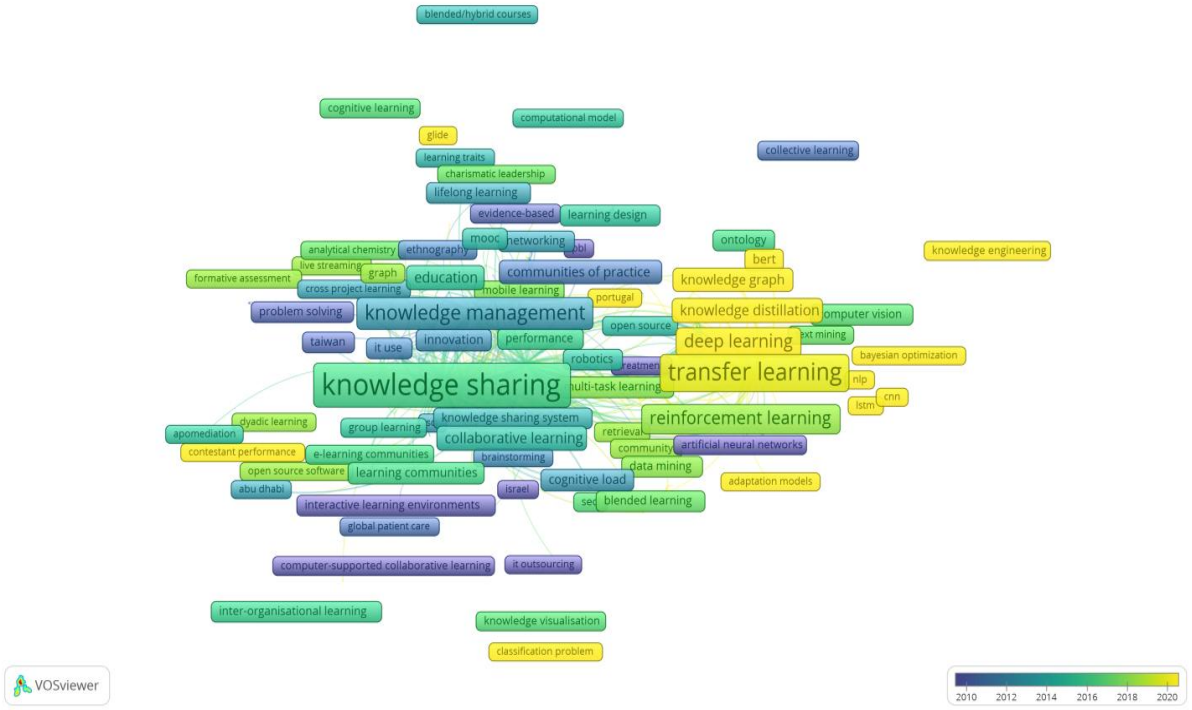

Fig. 14. Keyword map

5. DISCUSSION

The sharing of knowledge is an essential part of the growth of the educational system because it enables researchers, teachers, and students to talk about their experiences and share their perspectives, which in turn advances the field of study and encourages development. This bibliometric analysis primarily aims to chart research development regarding authors, journals, citations, countries, and themes.

A title search in the Scopus database returned 1154 results. It was decided to use a title search to investigate the papers. No distinction was made between article types, reviews, conference papers, book chapters, reviews, notes, etc. Most (53.1%) of the papers in this data collection are articles, whereas just 38% are from conferences. The documents spanned the years 1967 to 2023. The most significant year of publishing of the sought-after products was 2022. One way to rank authors in the world of publishing is based on the number of articles they have published and the level of specialization of those articles. Wang Y has the highest fractionalization rate (3.17), has published the most papers (12), and has substantially affected the scientific literature. Based on Lotka's law, 2513 (or 87.1%), authors have only written one paper. Overall, 751 references have been made to Yim J.'s 2017 paper. Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics are two book series focusing on some regions of computer science. There is a total of 44 paper in this publication. With an average of 31.30 citations per document, the United States of America ranks first, followed by China with 2477 citations. Over 150 documents include Chinese writers as their corresponding authors, suggesting that Chinese academics actively publish and collaborate. According to the number of publications, China is first among the top 10 countries, with 848 total. Peking University in China has the most publications (24) in this field, establishing it as a university leader. The examination of keywords showed that "knowledge sharing" was the most often used term (172).

The investigation unearthed several significant discoveries. First, during the past several years, there has been a discernible rise in research focusing on the benefits of knowledge sharing for academic progress. This directly reflects the increased priority that this topic is according within the academic community.

Integrating these approaches and technologies to promote educational knowledge sharing and

transmission is a research subject. Synergistic effects and how they might be used to create more robust learning and knowledge management systems are needed. Knowledge is considered a form of intangible property because of its high value, specific characteristics, route dependence, unclear causal relationships, and difficulty being replaced or replicated [43]. Knowledge sharing and transfer characteristics in varied educational contexts need to be clarified. Culture, leadership, and technology are crucial, but more research is needed to find procedures and treatments to help businesses exchange and transfer knowledge. Transfer learning research must go beyond machine learning. Transfer learning has shown potential in image recognition and natural language processing, but academic knowledge transfer and decision-making must be evaluated. Transfer learning can improve non-traditional learning outcomes and help with knowledge management. Knowledge management is pivotal in the educational process in a digital, global learning paradigm [44].

E-learning research needs unique pedagogical approaches and instructional design principles that optimize knowledge acquisition and transfer. E-learning systems should use virtual reality, augmented reality, and gamification to boost engagement, motivation, and retention. The development of cutting-edge technologies has guaranteed that students from all walks of life will have access to a wide variety of courses and have the chance to advance at their own pace [45]. The ethics of deep learning and reinforcement learning algorithms in knowledge management and learning systems are similarly unstudied. Algorithm bias, privacy issues, and transparent decision-making can help establish the ethical use of these technologies. Addressing these research gaps will help us understand how information sharing, transfer learning, e-learning, educational learning, deep learning, and reinforcement learning can improve learning outcomes, knowledge management, and educational innovation.

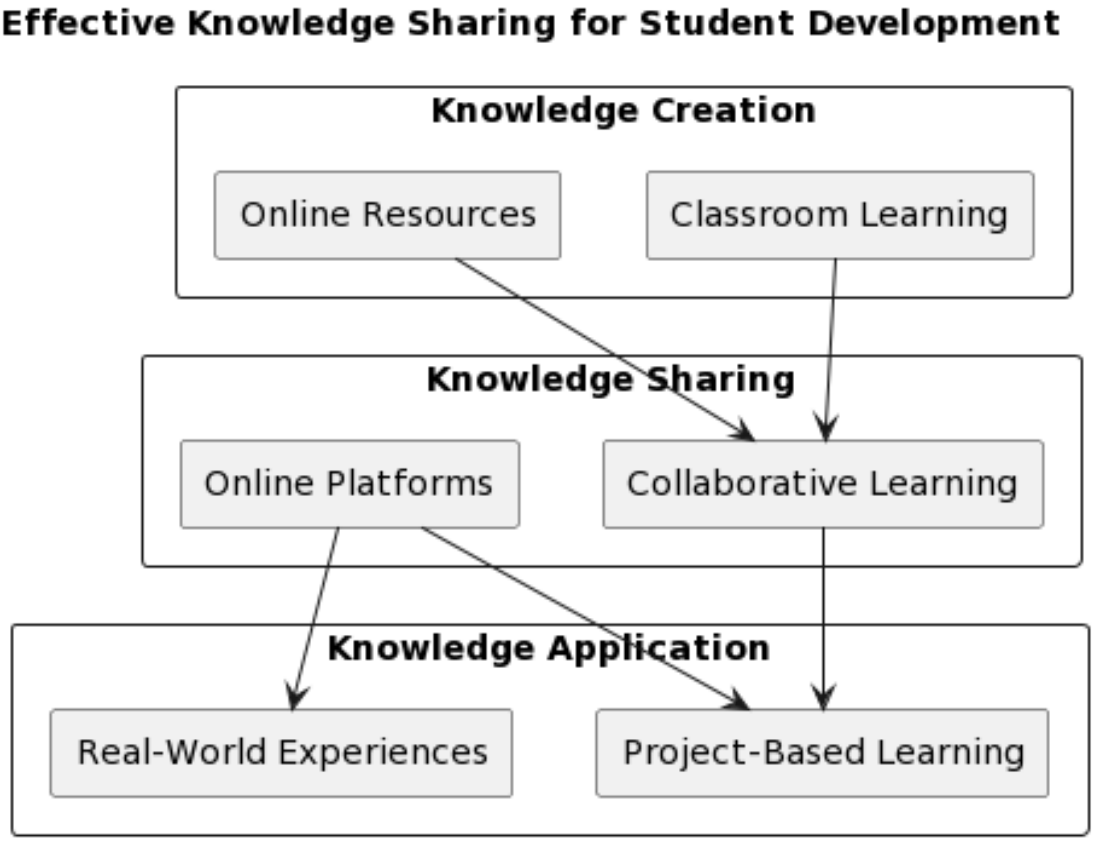

Fig. 15. Proposed model

6. CONCLUSION

This research has several caveats. To begin, this research relied on the Scopus Core Collection database, and not all knowledge-sharing papers were included. This could skew the results. The search was also limited to matters of title search only. Including a title, abstract, and keyword search option would have been helpful. Second, because the keyword co-occurrence analysis relied on the intercept frequency, low-frequency terms may have needed to be noticed, leading to potential data loss. Finally, these findings also require periodic updates. Knowledge sharing and academic development research may, in the future, use a more significant number of integrated tools and databases to increase the precision of their findings and better pinpoint emerging trends. Finally, the study has the potential to inform the development of policies and practices aimed at promoting effective knowledge sharing in higher education. By identifying the factors that facilitate or hinder knowledge sharing and the strategies that can be employed to promote it. Overall, the study provides valuable insights into the literature on knowledge sharing for academic development and can potentially inform future research and policy initiatives in this area.

7. RECOMMENDATIONS

Creating a collaborative platform or online community for R programming and bibliometric research can enhance active learning and knowledge sharing among students and holding regular R-based bibliometric analysis workshops, seminars, or webinars helps improve students' knowledge and skills. A propose model show in Fig. 15 can be an effective model for the development of student by knowledge sharing.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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