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Online learning platform – a bibliometric review of the literature & research frontier

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Abstract: The primary objective of this research is to trace the development of studies on online learning platforms (OLP) in the digital era. It provides a comprehensive bibliometric mapping of OLP articles published in globally recognized sources, offering detailed metadata analysis. The study pursues three main goals: first, to investigate the overall body of OLP literature; second, to outline the key characteristics of OLP-related publications; and third, to identify the main research areas within the field. Bibliometric analysis was conducted using VOSviewer and Biblioshiny, a Shiny application integrated with the Bibliometrix R package. These tools processed and visualized data retrieved from the Scopus database. The dataset included publications from 2003 to August 2023, refined through careful screening and validation. Findings provide significant insights into the evolution and current state of OLP research, highlighting frequently cited works, prolific authors, active countries, key sources, and keyword trends. Additionally, co-occurrence networks and thematic mapping reveal intellectual and conceptual structures in the domain. This study underscores both current and emerging directions in OLP research. Future work should extend the scope beyond Scopus by incorporating databases such as Web of Science and IEEE Xplore, while also encouraging broader international collaborations and thematic diversity.

Keywords: *Bibliometric analysis, Biblioshiny, VOSviewer, Online learning platform, OLP, Online learning.*

1. Introduction

The COVID-19 pandemic had a profound impact on the global education system, as highlighted by the United Nations Education, Scientific, and Cultural Organization [1]. To mitigate disruptions to students' learning during periods of school closures, numerous countries swiftly adopted information technology and OLPs or tools to facilitate extensive online teaching and learning [2]. During the COVID-19 crisis, online learning emerged as a viable alternative to traditional in-person education within schools. OLPs assumed a pivotal role, offering learners an essential means to acquire knowledge in a fully remote, home-based online learning environment [3]. Consequently, this shift prompted a proliferation of research endeavours aimed at understanding learners' acceptance and satisfaction with OLPs in the virtual learning environment.

Hill [4] provided a definition of an OLP as "a comprehensive framework that integrates a variety of tools, online services, and resources to offer a cohesive learning experience by harmonizing educational theory and practice, technology, and content." Notably, the utilization of these tools, online services, and resources need not be confined solely to formal institutional contexts. In fact, social media platforms such as blogs and wikis can also constitute integral components of an OLP that promote reflective learning [5].

OLPs offer a wide array of advanced technical tools that enable users to engage with fellow learners and instructors. These tools encompass real-time audio and video, augmented reality, and virtual reality

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[6]. Notably, several scholars turned to established models like the extended Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT) to investigate learners' reception of online learning and OLPs during the COVID-19 pandemic [7-9].

Compared to traditional learning systems, OLPs come with distinct advantages, including enhanced accessibility, permanence, immediacy, and interactivity [6]. These qualities ensure that users enjoy a convenient learning experience and have their needs for high-quality educational resources met. Consequently, an increasing number of learners are opting for these platforms to pursue their education. Presently, online learning holds substantial commercial value, leading to a growing number of institutions and training enterprises offering OLPs. As a result, learners are confronted with a burgeoning array of online learning options, contributing to a highly competitive market. Consequently, platform managers place significant emphasis on enticing learners to join their platforms and reducing attrition rates.

This study employs bibliometric analysis, a statistical approach to scrutinizing scholarly literature, to assess publication productivity and trends. It delves into the expansion and evolution of OLPs. This analysis allows the researcher to provide a detailed description of the emerging research area with a specific type of document, source, citation, keywords, network visualization, institution and many more. There are two bibliometric studies found related with OLP as stated in Table 1. In 2022, a study titled "Comprehending the Readiness of University Students for Online Learning: A Bibliometric Analysis" was published by Abuhassna, et al. [10]. This study examines online learning readiness among university students and employs bibliometric analysis to gain insights. It analyzes a substantial number of publications from the period of 2010 to 2020, utilizing Vosviewer as a visualization tool to process data from the Scopus database. The study identifies significant research themes, including E-learning readiness, ICT education, and the TAM, and also uncovers emerging topics such as digital learning and self-directed learning. The research offers valuable guidance for future researchers, emphasizing critical areas of potential success in the field.

Second article titled "Trends on Using the TAM for Online Learning: A Bibliometric and Content Analysis" is authored by Abuhassna, et al. [11]. This research investigates the trends related to the utilization of the TAM in the context of online learning. The study combines bibliometric analysis and content analysis, following the PRISMA framework. It encompasses research from 2002 to 2020 and examines 120 publications, documented in the Scopus database in January 2022, with specific inclusion and exclusion criteria applied. The analysis uncovers key subjects covered in the field and identifies prolific countries, educational institutions, journals, and influential authors. It also highlights various models for technology acceptance and outlines several online learning environments, including MOOC, Moodle, E-learning, flipped learning, and blended learning. The research offers valuable insights and guidance for future researchers, emphasizing critical areas with potential for further exploration. However, it acknowledges the need for more research to expand the application of the TAM model in different online learning contexts.

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Table 1.
Summary of previous studies.

Author	Domain/Search Strategy	Data Source & Scope	TDE	Bibliometric Attributes Examined
Abuhassna, et al. [11]	Online learning acceptance, OLPs, online learning environments. Technology acceptance model, TAM	Scopus	120	- Journal ranks by total citations - Keywords distribution - Top authors - Top countries - Top institution - Distribution publication per year
Abuhassna, et al. [10]	Online learning readiness, OLPs, online learning environments, technology adoption, ICT adoption, student's readiness, student's satisfaction, student's autonomy, student's achievement.	Scopus	885	- Journal ranks by total citations - Keywords distribution - Top authors - Top countries - Distribution publication per year

1.1. TDE=Total Documents Examined

The gap in this study, as compared to the past studies, lies in the scope and recency of the data used. While the two previous studies focused on specific aspects of online learning readiness and the use of the TAM, they may not have provided a comprehensive overview of the current state of the OLP landscape. In contrast, this study utilizes a substantial dataset of 1,330 articles extracted as of August 23, 2023. This recency and breadth of data collection enable this research to present a more up-to-date and comprehensive analysis of OLP, incorporating recent developments and trends in the field. This is particularly important in the fast-evolving domain of online education and learning platforms, where the educational landscape has witnessed significant transformations due to factors such as the COVID-19 pandemic. This study can bridge the gap by providing a more current and extensive assessment of OLP, which may not have been fully captured by prior studies focusing on specific elements within the larger online learning ecosystem. This research can offer a more relevant and timely perspective on the state of OLP in 2023 and beyond, thereby contributing valuable insights for both academia and practical applications in online education.

Furthermore, this study offers a contemporary and advanced approach to analysis by placing a distinct focus on the bibliographic attributes of articles within the realm of OLP, which is in stark contrast to traditional trend analysis. This approach empowers the researcher to conduct intricate network analysis of keywords and titles, thereby enabling the identification of thematic clusters within the subject area under investigation. Additionally, through the application of science mapping and network analysis, the researcher can provide a comprehensive overview of authorship, source materials, and citation patterns in prior studies. This study is developed to answer the following research questions:

1. What attributes define document profiles, encompassing document types, source types, languages, and subject areas, within the context of OLP research?
2. How have publication patterns related to OLP evolved over time, and what are the current trends?
3. Who are the most productive authors in the OLP field, and what are the central themes and subjects within their research?
4. Which institutions wield the most influence in the realm of OLP, and what contributions have they made to its advancement?
5. Which countries are the most active participants in OLP research, and how does this involvement vary across different regions and time-frames?

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6. In what ways can an examination of source titles enhance our comprehension of research in the OLP domain?
7. Which documents receive the highest citation rates in the field of OLP, and what primary themes and subjects do they address?
8. What predominant themes and subjects emerge from the analysis of co-occurring author keywords and title/abstract terms in the literature pertaining to OLP?

The paper's organization is as follows. The subsequent section will address the progression of the literature review within the broader realm of OLP. This will be followed by an examination of prior bibliometric studies related to OLP. The paper will then delineate the bibliometric methodology employed in this study, involving the utilization of various bibliometric tools. This section will also include references and a flowchart outlining the process for conducting the bibliometric analysis. The discourse will subsequently shift to the detailed analysis undertaken to address the research questions. Following this analysis, there will be a section devoted to discussing the findings, outlining the contributions, acknowledging limitations, and providing recommendations for future research.

2. Methods

This bibliometric analysis scrutinized the publications sourced from the Scopus scientific database, like previous bibliometric research studies that extensively employed Scopus, as exemplified by studies such as those conducted byAbuhassna, et al. [10] and Abuhassna, et al. [11]. The selection of the Scopus database as the primary data source for this study is attributable to its extensive coverage, encompassing a repository of over 70 million records, which includes multidisciplinary journals. Noteworthy attributes of Scopus include its rigorous quality control, capacity for full-text searches, support for lengthy search queries, advanced search functionalities, and the reliability of search results across diverse locations, as established by prior studies [12, 13]. In this thesis, exclusive reliance on the Scopus database is due to its comprehensive provision of citation information, bibliographical particulars, abstracts, keywords, funding details, and references. While Web of Science (WOS) similarly offers detailed data, it is acknowledged as a constraint in this thesis that the author lacks access to WOS. Regrettably, this limitation precludes the incorporation of data from WOS, notwithstanding its recognized potential as a valuable source of information.

2.1. Search Strategy

This study conducted a bibliometric analysis using the Scopus database as of August 2023. To identify relevant publications in any language, we utilized the search query 'TITLE-ABS-KEY ("online learning platform")' within the Scopus database. This search query included titles, abstracts, and keywords to broaden the scope of our search, ensuring that we didn't miss important articles related to OLPs, even if the term “online learning platform” was not explicitly mentioned in their titles. Our search strategy is illustrated in Figure 1. This initial search yielded a sample of 1330 publications.

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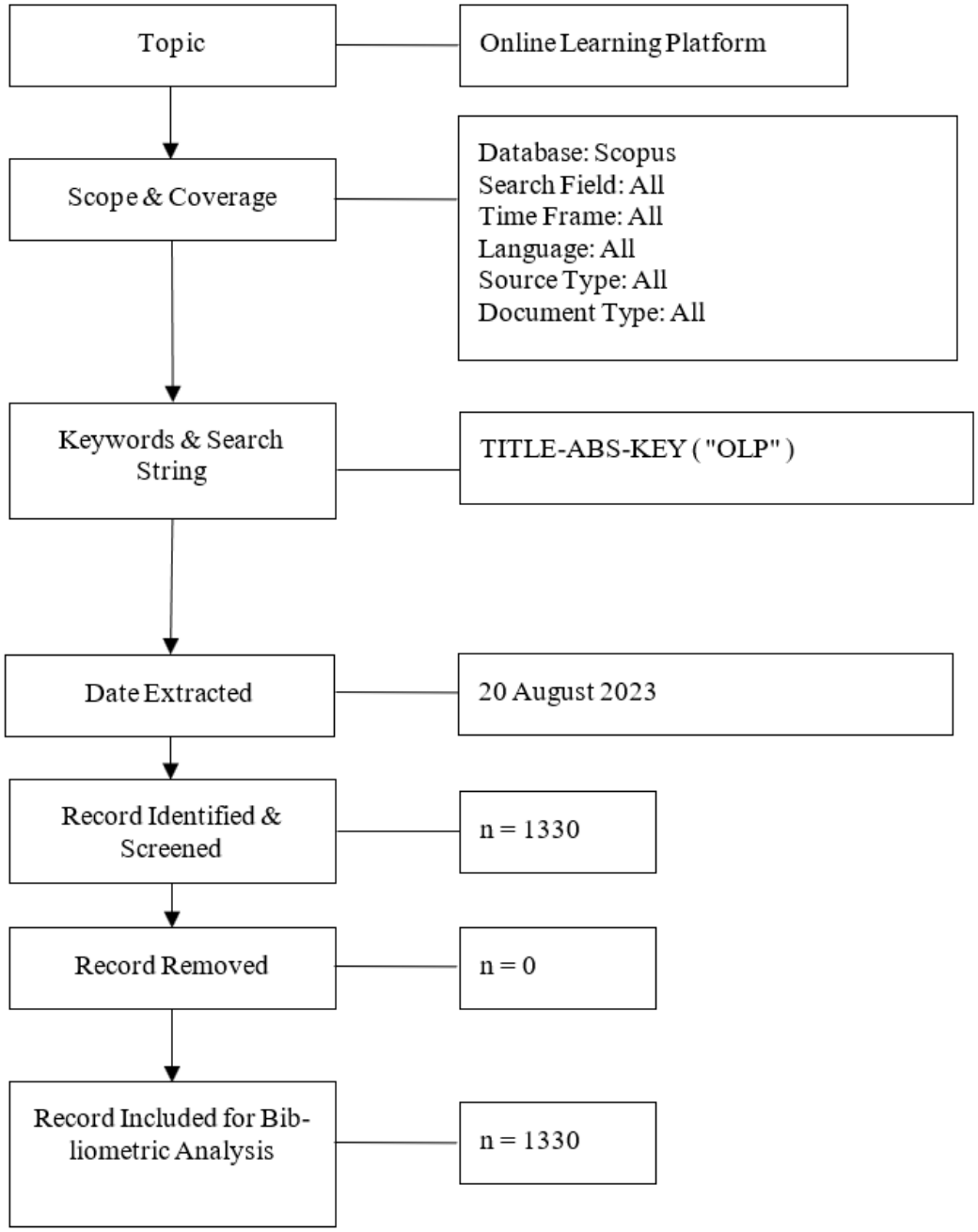

Figure 1.
Flow diagram of the search strategy.

2.2. Tool and Data Analysis

This study conducted an analysis of performance in bibliometric research, as outlined in Dabbagh and Kitsantas [5]. This analysis encompassed several aspects, including the characterization of document profiles in terms of document type, source type, languages, and subject areas (RQ1), as well as the exploration of publication trends (RQ2), author-specific publications (RQ3), institutional contributions (RQ4), national contributions (RQ5), source title analysis (RQ6), highly cited documents

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(RQ7), and keyword examination (RQ8) in the context of research on OLP. We computed the frequency and percentage of each publication and created the necessary graphs using Microsoft Excel. Additionally, we expanded our investigation by employing VOSviewer (version 1.6.19), a freely available software tool developed by Varalakshmi and Arunachalam [2] that facilitates the extraction of citation data, bibliographical information, and keywords for the purpose of visualizing co-authorship and co-citation networks among authors. Moreover, our study also made use of Biblioshiny to analyze keywords in the titles and abstracts of documents. Biblioshiny, a shiny application designed for use with the Bibliometrix R package, was developed byAria and Cuccurullo [14] Simarily focuses on facilitating science mapping analyses.

3. Results

In this section, we present the research we did to figure out the status of publications about OLP in the Scopus database. The presented bibliometric metrics offer a concise snapshot of the research landscape in the field of OLP, based on data from the Scopus database. With 1,330 papers and a total of 7,823 citations over 21 years, this field has seen robust scholarly activity. The average of 391.15 citations per year underscores its continued relevance. Each paper, on average, receives 5.88 citations, while each author garners 1.68 citations, reflecting the collective and impactful nature of research in this domain. Furthermore, an average of 3.49 authors per paper indicates collaboration. Finally, the h-index of 37 and g-index of 62 collectively demonstrate the substantial scholarly influence, with numerous papers receiving citations that exceed their publication years or contributions to the overall impact in this evolving field.

3.1. Documents Profiles

Table 2 demonstrates the distribution of publications in the context of OLPs, revealing that research articles and conference papers are the primary document types, comprising a substantial majority of the total publications at 47.07% and 45.41%, respectively. This suggests a research-intensive field with a focus on in-depth scholarly output and timely dissemination through conferences. Book chapters and reviews are relatively less common, indicating potential areas for more comprehensive and synthesized contributions. The presence of categories like "Retracted" and "Conference Review" raises questions about quality control and integrity in this research domain, warranting further investigation. Overall, the table underscores the diverse landscape of document types in OLP research, offering insights into the nature and dynamics of academic contributions in this field.

Table 2.
Document Type.

Document Type	Total Publications (TP)	Percentage (%)
Article	626	47.07%
Conference Paper	604	45.41%
Book Chapter	55	4.14%
Review	20	1.50%
Conference Review	13	0.98%
Note	3	0.23%
Retracted	3	0.23%
Data Paper	2	0.15%
Short Survey	2	0.15%
Total	1330	100.00

Table 3 presents a critical overview of publication sources in the field of OLPs. It underscores the predominant role of academic journals, constituting nearly half of the total publications at 49.55%, indicating a focus on scholarly rigor and peer-reviewed research dissemination. Conference proceedings, at 37.67%, reflect the significance of academic conferences as platforms for sharing evolving research

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trends and insights. The relatively smaller proportions of book series and standalone books (9.55% and 3.08%, respectively) suggest a preference for shorter, more focused contributions. The presence of trade journals, though minimal at 0.15%, suggests some industry engagement. In sum, the table emphasizes the dominance of academic channels for research dissemination, along with conference proceedings, in the domain of OLPs.

Table 3.
Source Type.

Source Type	Total Publications (TP)	Percentage (%)
Journal	659	49.55%
Conference Proceeding	501	37.67%
Book Series	127	9.55%
Book	41	3.08%
Trade Journal	2	0.15%
Total	1330	100.00

Table 4 offers a concise and insightful examination of the languages in which publications related to OLPs are disseminated. English dominates as the primary language, constituting an overwhelming 97.89% of the total publications, indicative of the global predominance of English in academic discourse. While other languages like Chinese and German have a presence, they remain relatively minimal at 0.75% and 0.68%, respectively. The inclusion of various languages such as Spanish, Russian, and Portuguese, each at around 0.2%, underscores the international scope of research in this field. However, English's overwhelming dominance suggests a need for linguistic diversity and broader global representation in the scholarly discourse surrounding OLPs.

Table 4.
Languages.

Language	Total Publications (TP)*	Percentage (%)
English	1302	97.89%
Chinese	10	0.75%
German	9	0.68%
Spanish	6	0.45%
Russian	3	0.23%
Portuguese	2	0.15%
French	1	0.08%
Moldavian	1	0.08%
Moldovan	1	0.08%
Romanian	1	0.08%
Serbian	1	0.08%
Total	1337	100.00

Note: *one document has been prepared in dual languages.

Table 5 depicts the subject areas within the domain of OLPs. Computer Science and Social Sciences are the dominant fields, accounting for 55.56% and 45.49% of the publications, respectively. Engineering, Mathematics, and Decision Sciences are also notable contributors. The diversity of subject areas such as Medicine, Psychology, and Arts and Humanities demonstrates the interdisciplinary nature of research in OLPs. The table reflects the significance of technology, social sciences, and a range of scientific and professional disciplines in shaping the discourse on online education, suggesting a multifaceted approach to understanding this field.

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Table 5.
Subject Area.

Subject Area	Total Publications (TP)	Percentage (%)
Computer Science	739	55.56%
Social Sciences	605	45.49%
Engineering	323	24.29%
Mathematics	149	11.20%
Decision Sciences	115	8.65%
Medicine	99	7.44%
Psychology	71	5.34%
Business, Management and Accounting	68	5.11%
Physics and Astronomy	61	4.59%
Arts and Humanities	60	4.51%
Energy	37	2.78%
Environmental Science	30	2.26%
Materials Science	25	1.88%
Economics, Econometrics and Finance	23	1.73%
Health Professions	20	1.50%
Nursing	19	1.43%
Earth and Planetary Sciences	10	0.75%
Multidisciplinary	10	0.75%
Agricultural and Biological Sciences	9	0.68%
Neuroscience	9	0.68%
Chemical Engineering	7	0.53%
Chemistry	6	0.45%
Biochemistry, Genetics and Molecular Biology	4	0.30%
Dentistry	4	0.30%
Pharmacology, Toxicology and Pharmaceutics	4	0.30%
Veterinary	1	0.08%

3.2. Publication Trends

Table 6 provides a rich dataset reflecting the evolving scholarly landscape in the domain of OLPs. It reveals a distinct trend characterized by an increase in both the quantity and impact of research over the years. The Total Publications (TP) demonstrate a clear upward trajectory, reaching a peak in 2022, indicative of a field experiencing exponential growth in research output. This surge in publications is further substantiated by the Total Citations (TC), which showcase a gradual but consistent increase, attaining its zenith in 2021. This growth in TC is coupled with a rise in the Average Citations per Publication (C/P), reflecting a heightened recognition of individual works, particularly in recent years. An interesting observation emerges when considering the Average Citations per Cited Publication (C/CP). While the overall trend is upward, it suggests a more nuanced story. It highlights that while more works are receiving recognition, some are attracting substantial citations, potentially indicating a polarization in the impact of research within the field, with a select number of publications gaining substantial recognition. The h-index (h) and g-index (g) reinforce this narrative. Both exhibit consistent growth, signalling an increasing number of influential publications over the years. The h-index reflects the number of works with a corresponding number of citations, while the g-index places greater emphasis on highly cited works, indicating a concentrated influence. Figure 2 demonstrates a noticeable trend of publication regarding OLP from 2003 to 2023, as depicted in the graph.

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Table 6.
Year of Publication

Year	TP	NCP	TC	C/P	C/CP	*h*	*g*
2003	3	2	61	20.33	30.50	2	3
2004	1	1	22	22.00	22.00	1	1
2005	2	2	3	1.50	1.50	1	1
2006	1	0	0	0.00	0.00	0	0
2007	1	0	0	0.00	0.00	0	0
2008	5	3	230	46.00	76.67	2	5
2009	10	9	143	14.30	15.89	5	10
2010	7	4	24	3.43	6.00	2	4
2011	14	5	17	1.21	3.40	2	4
2012	15	10	107	7.13	10.70	5	10
2013	13	10	500	38.46	50.00	5	13
2014	21	16	343	16.33	21.44	7	18
2015	32	29	326	10.19	11.24	9	17
2016	45	37	310	6.89	8.38	11	15
2017	70	58	568	8.11	9.79	14	20
2018	58	46	581	10.02	12.63	13	22
2019	90	68	430	4.78	6.32	11	17
2020	141	107	1401	9.94	13.09	20	34
2021	304	202	2052	6.75	10.16	22	38
2022	344	169	652	1.90	3.86	11	17
2023	153	21	53	0.35	2.52	4	5
Total	**1330**	**799**	**7823**	**5.88**	**9.79**		

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

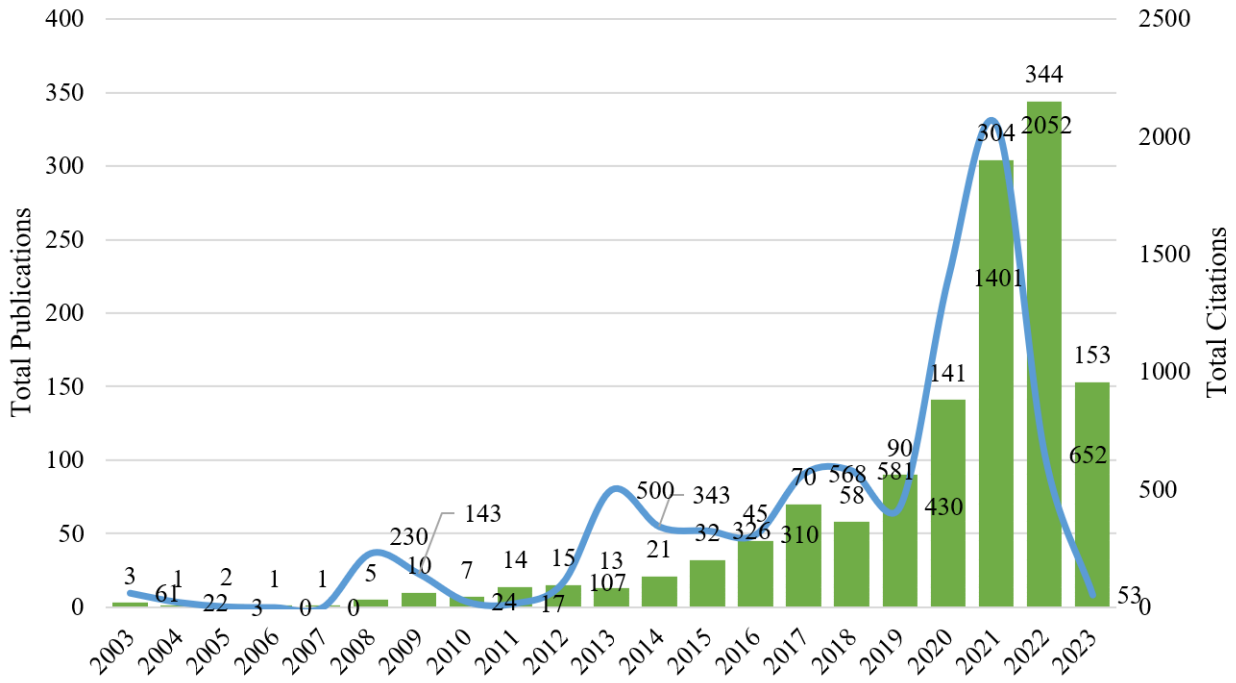

Figure 2.
Total Publications and Citations by Year.

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3.3. Publications by Authors

Table 7 provides a comprehensive overview of the most productive authors in the field of OLPs based on the Scopus database. These authors have made significant contributions to the academic discourse on this topic, each with a notable number of TP to their name. Leading the list is Neil T. Heffernan from Worcester Polytechnic Institute, United States, with 19 publications. Notably, Heffernan is not only the most prolific author but also stands out with a high C/P of 5.68, indicative of the impact of his work. Following closely is Ryan S. Baker from the University of Pennsylvania, also in the United States, with 7 publications and an impressive C/P of 8.14. Noraffandy Yahaya from Universiti Teknologi Malaysia in Malaysia demonstrates the global reach of this research field with 7 publications and a high C/P of 17.43. The table underscores the diversity in affiliations and countries of these productive authors, signifying the international nature of research in OLPs. While the quantity of publications is essential, it's equally vital to consider the C/P metric, which highlights the impact and recognition of their works. These authors, along with their substantial publication records, contribute significantly to advancing knowledge in OLPs. Their presence in the table is a testament to their scholarly influence and the vibrancy of research in this field.

Table 7.
Most Productive Authors.

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP
Hill [4]	Worcester Polytechnic Institute	United States	19	12	108	5.68	9.00
Baker and Hawn [15]	University of Pennsylvania	United States	7	5	57	8.14	11.40
Yuen and Ma [16]	Universiti Teknologi Malaysia	Malaysia	7	6	122	17.43	20.33
Prihar, et al. [17]	Worcester Polytechnic Institute	United States	6	3	3	0.50	1.00
Utunen, et al. [18]	World Health Organization	Switzerland	6	6	18	3.00	3.00
Abuhassna, et al. [19]	Universiti Teknologi Malaysia	Malaysia	6	5	119	19.83	23.80
Ostrow and Heffernan [20]	Worcester Polytechnic Institute	United States	6	4	59	9.83	14.75
Toppenberg-Pejcic, et al. [21]	World Health Organization	Switzerland	5	5	16	3.20	3.20
Dabbagh and Kitsantas [5]	Worcester Polytechnic Institute	United States	5	4	66	13.20	16.50
Chen, et al. [22]	Guilin University of Aerospace Technology	China	5	3	31	6.20	10.33
Fischer, et al. [23]	University of Toronto	Canada	5	5	68	13.60	13.60
Prasetyo, et al. [24]	Worcester Polytechnic Institute	United States	5	4	32	6.40	8.00
Emmel, et al. [25]	Worcester Polytechnic Institute	United States	4	2	2	0.50	1.00

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication.

Table 8 becomes evident that the most prevalent category is composed of authors who have contributed a single document (209 authors, 15.71%), indicating a significant number of individual research contributions in this field. Yet, the table also uncovers an intriguing shift toward more collaborative authorship. For instance, 20.23% of the publications result from the collaborative efforts of two authors (269 documents), and another 20.45% come from the contributions of three authors (272 documents). These statistics signify a substantial degree of research collaboration within the OLP domain, underscoring the importance of collective intellectual input in producing scholarly works. One particularly striking instance is the publication authored by 59 individuals. This singular document, produced through the collaborative efforts of 59 authors, showcases the extensive collaboration that can

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occur in specialized research areas such as OLPs. It is a testament to the collaborative nature of scientific inquiry, where multiple experts from diverse backgrounds come together to contribute to the advancement of knowledge in this field. Overall, the table elucidates the intricate landscape of authorship in OLP research, encompassing both individual and collaborative contributions that collectively shape the evolving discourse in this domain.

Table 8.
Number of Author(s) per document.

Author Count	Total Publications (TP)	Percentage (%)
1	209	15.71
2	269	20.23
3	272	20.45
4	236	17.74
5	148	11.13
6	88	6.62
7	29	2.18
8	24	1.80
9	13	0.98
10	9	0.68
11	3	0.23
12	2	0.15
13	3	0.23
14	3	0.23
15	1	0.08
18	2	0.15
19	1	0.08
59	1	0.08
0*	17	1.28
Total	1330	100.00

Note: *No author is listed.

3.4. Publications by Institutions

Table 9 provides a comprehensive view of the most productive institutions in the domain of OLPs, drawing from data sourced from the Scopus database. These institutions have made substantial contributions to the scholarly discourse within this field, as evidenced by their impressive TP counts. Notably, Central China Normal University in China emerges as the leading institution, with a remarkable 82 publications. Following closely is Worcester Polytechnic Institute in the United States, with 75 publications, indicating a strong presence of this institution in advancing research in OLPs. Universiti Teknologi Malaysia, located in Malaysia, also distinguishes itself with 48 publications, further underscoring the international scope of research in this field. The table highlights the diversity of institutions, both in terms of geography and academic focus, contributing to the collective body of knowledge on OLPs. Importantly, the TC figures indicate the impact of their work, with varying degrees of average C/P and C/CP. This table not only showcases the productivity of these institutions but also hints at their scholarly influence and the vibrant state of research in OLPs worldwide.

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Table 9.
Most Productive Institutions.

Affiliation	Country	TP	NCP	TC	C/P	C/CP
Central China Normal University	China	82	441	44	5.38	10.02
Worcester Polytechnic Institute	USA	75	486	44	6.48	11.05
Universiti Teknologi Malaysia	Malaysia	48	830	43	17.29	19.30
Universiti Teknologi Mara	Malaysia	34	259	22	7.62	11.77
World Health Organization	Switzerland	33	99	33	3.00	3.00
Beijing Normal University	China	30	61	16	2.03	3.81
Bina Nusantara University	Indonesia	29	98	17	3.38	5.76
Beihang University	China	26	70	21	2.69	3.33
Sri Lanka Institute of Information Technology	Sri Langka	25	2	2	0.08	1.00
Coventry University	United Kingdom	25	74	22	2.96	3.36
East China Normal University	China	25	279	13	11.16	21.46
Guilin University of Electronic Technology	China	23	12	3	0.52	4.00
South China Normal University	China	23	117	12	5.09	9.75
National University of Defense Technology	China	20	46	11	2.30	4.18
Zhejiang Gongshang University	China	19	154	18	8.11	8.56

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Conducting co-authorship analysis based on organizational affiliations, Figure 3 highlights three organizations with significant node sizes, signifying the total number of publications attributed to each institution. These nodes' colours provide insights into the average publication activity period concerning OLPs (OLP). The purple nodes, for instance, indicate that, on average, organizations began publishing related articles around 2018, while the yellow nodes suggest an average commencement year of approximately 2022. Notably, many organizations tend to work independently, which is a trait even noticeable in highly productive institutions like Central China Normal University. Nevertheless, the figure illustrates the presence of two distinct clusters. One is led by Universiti Teknologi Malaysia, while the other is spearheaded by Worcester Polytechnic Institute in the United States.

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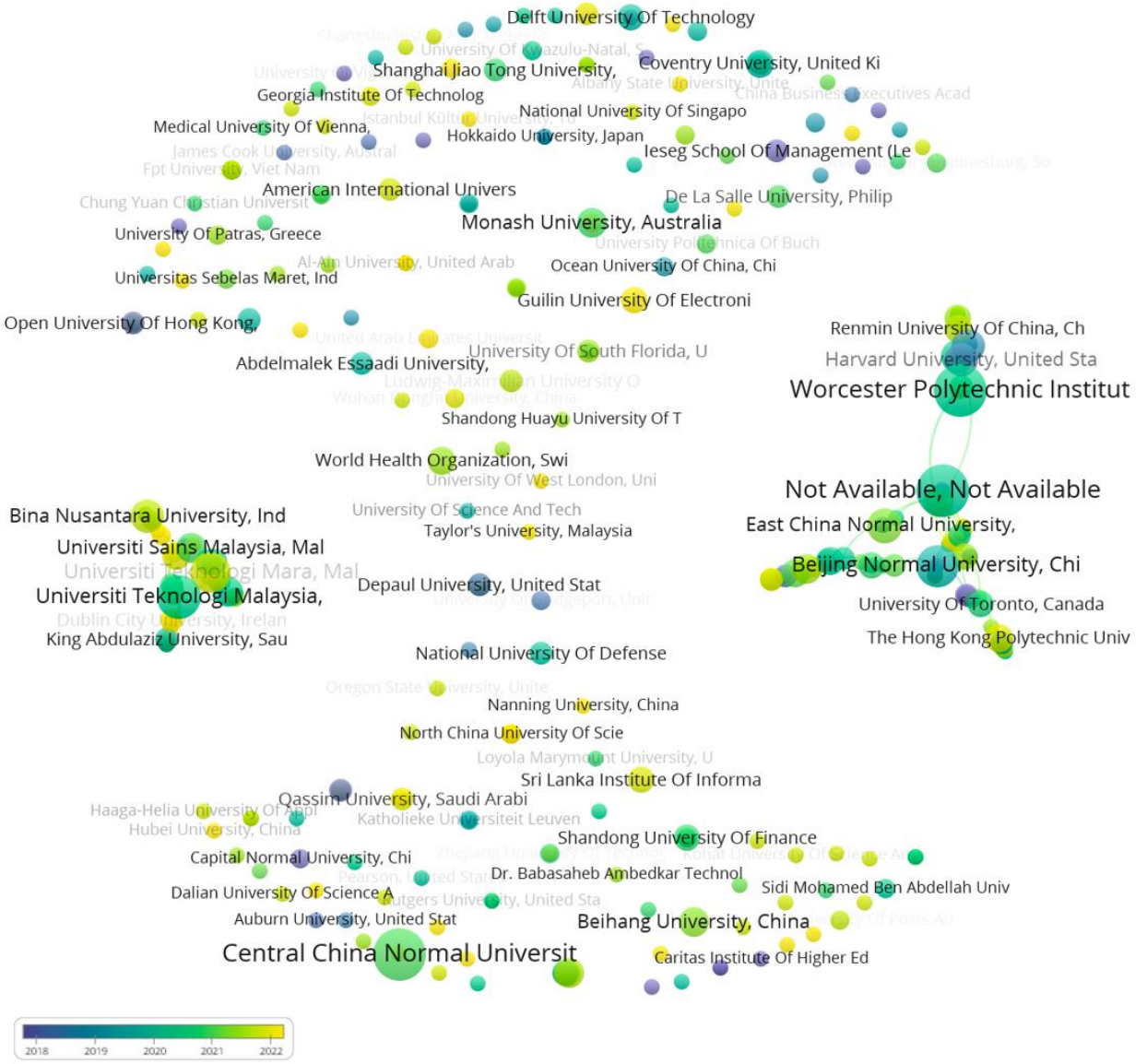

Figure 3.
Network visualisation map of the co-authorship by organisations with minimum two documents per organisation.

Figure 4 provides a detailed depiction of two distinct clusters, each comprising universities from various countries. The first cluster, led by Universiti Teknologi Malaysia, highlights extensive collaboration among Malaysian universities, including Universiti Teknologi MARA, Universiti Sains Malaysia, Universiti Kebangsaan Malaysia, Universiti Kuala Lumpur, Universiti Pendidikan Sultan Idris, Universiti Tun Hussein Onn, and Universiti Utara Malaysia. Additionally, universities from Indonesia, such as Universitas Ahmad Dahlan, Universitas Negeri Yogyakarta, Bina Nusantara University, and Universitas Negeri Jakarta, actively participate in this cluster. Beyond Malaysia and Indonesia, universities like Dublin City University and Staffordshire University from the United Kingdom, King Abdulaziz University and Jouf University from Saudi Arabia, as well as Mahidol University from Thailand, also engage in collaborative research within this cluster. In the second

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cluster, a predominant number of universities hail from Western countries, including the University of California, Harvard University, the University of Michigan, Carnegie Mellon University, Arizona State University, the University of Toronto, and Newcastle University. Additionally, several organizations from Asia, with a notable presence from China, are part of this cluster. These Chinese institutions encompass East China Normal University, Beijing Normal University, Dalian University of Technology, South China Normal University, Yangzhou University, and Jilin University.

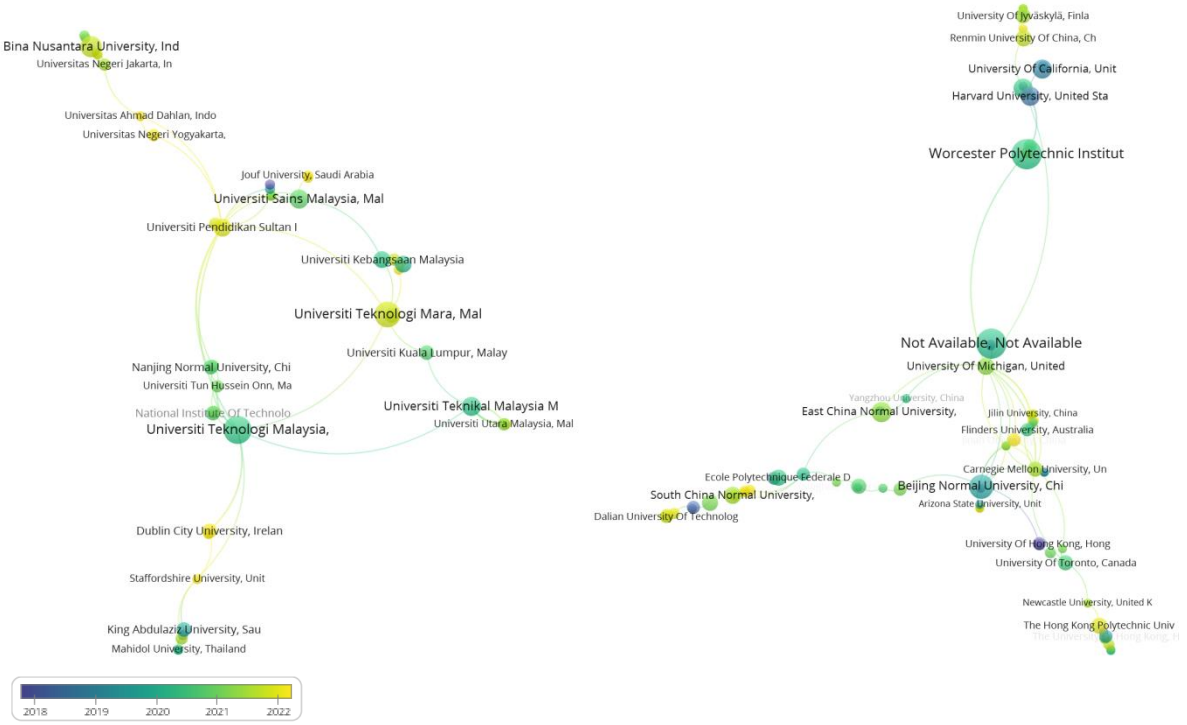

Figure 4.
Network visualisation map of the co-authorship by organisations (in detail).

3.5. Publications by Countries

Table 10 provides a comprehensive view of the Top 20 countries that have made substantial contributions to the field of OLPs, drawing upon data from the Scopus database. These countries, each with varying degrees of research output, collectively underscore the global significance of this research area. Unquestionably, China emerges as the leading contributor, with a remarkable 1041 publications, highlighting its pivotal role in advancing knowledge in OLPs. The United States follows closely, underlining its substantial presence in this field with 637 publications. Notably, India, Indonesia, and Malaysia demonstrate a strong regional presence in the Top 5, emphasizing the vibrant nature of research in Asian countries. Furthermore, this table reveals the impact of these publications, with various countries exhibiting diverse C/P and C/CP. The h-index and g-index serve as indicators of scholarly influence, revealing that some countries have not only contributed significantly in terms of quantity but have also generated highly impactful research in the realm of OLPs. Overall, this table serves as a testament to the international reach and multidisciplinary nature of research in this field, emphasizing the diverse geographic locations from which innovative contributions to OLPs originate.

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Table 10.
Top 20 Countries contributed to the publications

Country	TP	NCP	TC	C/P	C/CP	*h*	*g*
China	1041	4597	590	4.42	7.79	33	31
United States	637	5427	440	8.52	12.33	37	24
India	278	1683	100	6.05	16.83	4	4
Indonesia	237	890	156	3.76	5.71	4	4
Malaysia	207	1889	147	9.13	12.85	15	13
Germany	200	1133	160	5.67	7.08	1	1
United Kingdom	183	1375	134	7.51	10.26	19	11
Hong Kong	98	1239	71	12.64	17.45	13	8
Australia	97	910	86	9.38	10.58	10	8
Canada	88	431	78	4.90	5.53		
Spain	86	493	53	5.73	9.30	5	5
Switzerland	82	692	81	8.44	8.54	9	7
Taiwan	82	697	57	8.50	12.23	8	8
Italy	74	96	74	1.30	1.30		
Russian Federation	58	271	25	4.67	10.84	2	2
Turkey	49	108	27	2.20	4.00	1	1
Saudi Arabia	45	847	31	18.82	27.32	12	4
United Arab Emirates	45	302	24	6.71	12.58	3	3
Thailand	44	406	38	9.23	10.68	2	2
Philippines	40	530	24	13.25	22.08	8	5

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Utilizing co-authorship analysis with a focus on countries, this investigation discerned two primary nations significantly linked to research on OLPs, namely China and the United States. Furthermore, it was evident that a majority of countries engaged in collaborative efforts with both of these key nations. Figure 5 provides a visual representation of distinct research clusters. The first cluster pertains to Southeast Asia (SEA) and encompasses countries such as Malaysia, Indonesia, Vietnam, the Philippines, and Thailand. This SEA cluster also exhibits robust collaborative ties with countries beyond its regional boundaries, including Saudi Arabia, Yemen, and Turkey. The second cluster is associated with East Asia, encompassing Japan, South Korea, Taiwan, Hong Kong, Macao, and China. Lastly, the third cluster pertains to Europe, featuring countries like Spain, Portugal, Romania, Poland, Germany, Sweden, Finland, the United Kingdom, Norway, Italy, and the Netherlands. It is noteworthy that South Africa and Morocco, while not European nations, exhibit substantial collaborative connections with Spain. The mapping representation indicates that the SEA and East Asia clusters primarily collaborate with China, whereas the European cluster tends to engage in research partnerships with the United States.

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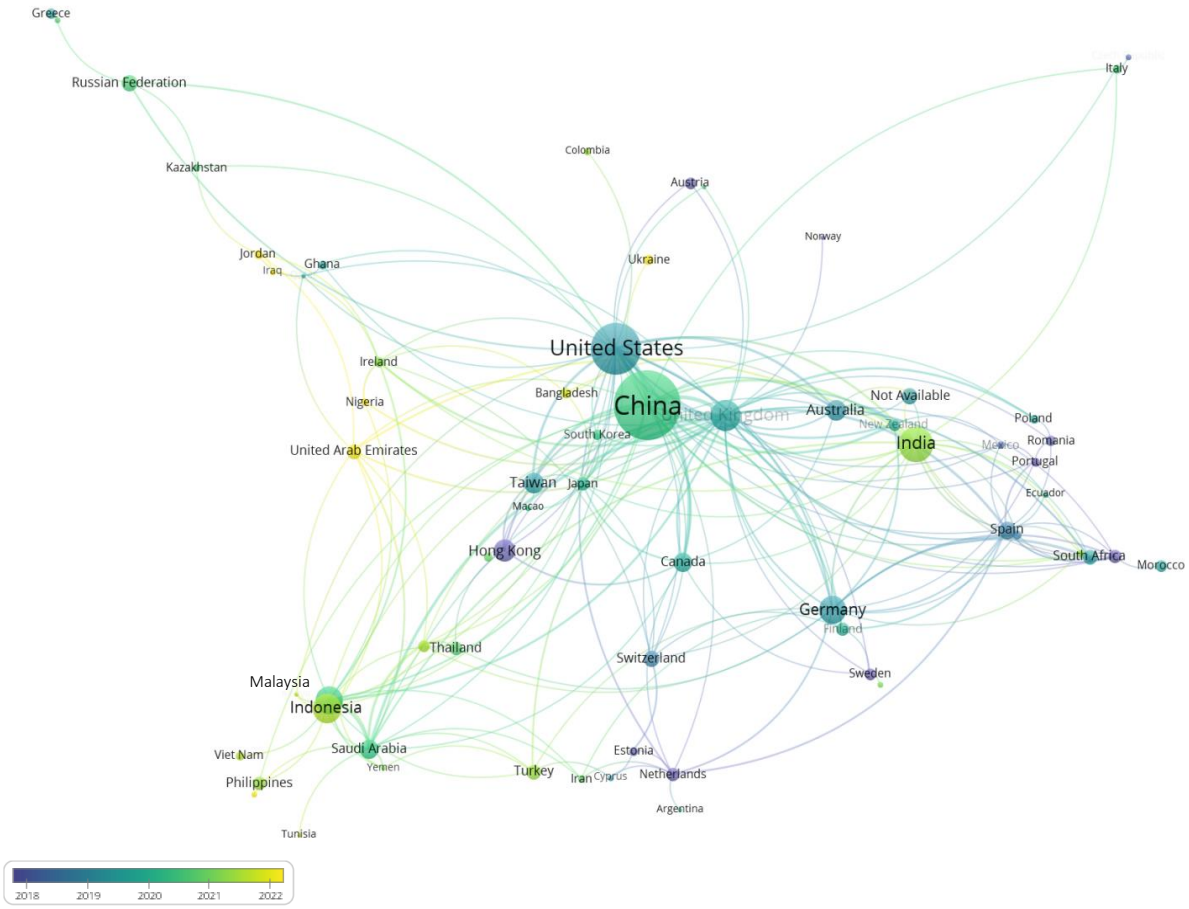

Figure 5.
Network visualisation map of the co-authorship by countries with minimum two document per country.

3.6. Publications by Source Titles

Table 11 presents a comprehensive view of the most active source titles in the realm of OLPs, utilizing data sourced from the Scopus database. It provides valuable insights into the scholarly landscape of this field by highlighting the sources that have made the most substantial contributions. Notably, the "International Journal of Emerging Technologies in Learning" emerges as the most active source title, with 26 publications. This source title appears to be a focal point for research in OLPs, reflecting its influence and appeal within the academic community. Additionally, "ACM International Conference Proceeding Series" and "Lecture Notes in Computer Science" follow closely, each with a significant number of publications. These source titles showcase the diversity of academic platforms, with conferences and journals playing vital roles in disseminating research findings. Overall, this table illuminates the key source titles that drive research and knowledge dissemination in this field, providing an invaluable resource for academics and researchers seeking to engage with the most active and influential sources in the realm of OLPs.

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Table 11.
Most active source titles.

Source Title	TP	NCP	TC	C/P	C/CP	*h*	*g*
ACM International Conference Proceeding Series	56	29	119	2.13	4.10	5	9
Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	48	30	108	2.25	3.60	5	7
International Journal of Emerging Technologies in Learning	26	22	265	10.19	12.05	6	16
Journal of Physics: Conference Series	20	14	49	2.45	3.50	4	5
Communications in Computer and Information Science	17	4	23	1.35	5.75	2	4
Frontiers in Psychology	16	12	106	6.63	8.83	4	10
AIP Conference Proceedings	14	1	1	0.07	1.00	1	1
Sustainability (Switzerland)	12	9	294	24.50	32.67	6	12
CEUR Workshop Proceedings	10	4	12	1.20	3.00	3	3
Education Sciences	10	7	228	22.80	32.57	6	10
International Journal of Interactive Mobile Technologies	10	9	97	9.70	10.78	6	9
Education and Information Technologies	9	4	99	11.00	24.75	3	9
Lecture Notes in Networks and Systems	9	5	11	1.22	2.20	2	2
IEEE Global Engineering Education Conference, EDUCON	9	8	49	5.44	6.13	4	6

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

3.7. Highly Cited Documents

Table 12 presents a compilation of the Top 20 highly cited articles in the domain of OLPs, utilizing data from the Scopus database. These articles have garnered significant attention and scholarly impact, with total citations ranging from 58 to 384, showcasing their enduring influence in the field. The research topics covered are diverse, reflecting the multifaceted nature of online education. They encompass themes such as students' characteristics and self-regulated learning, technology self-efficacy, and course outcomes. Several articles delve into the impact of online learning during the COVID-19 pandemic, examining aspects like students' perception and preference, usability evaluation of platforms like Microsoft Teams, and the effects on academic performance. Furthermore, pedagogical frameworks for educators in online classrooms and factors affecting the acceptance of e-learning platforms are also explored. The broad spectrum of subjects addressed in these articles underscores the depth and breadth of research in the field of OLPs, providing valuable insights into its development and evolution, and the enduring relevance of these studies is demonstrated by the high citations per year, with one article even attaining an impressive 94 citations per year. These articles serve as pivotal resources for both researchers and practitioners seeking to comprehend and enhance the online learning experience.

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Table 12.
Top 20 highly cited articles.

No.	Authors	Title	TC	C/Y
1	Wang, et al. [26]	Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning	384	34.91
2	Muthuprasad, et al. [27]	Students' perception and preference for online education in India during COVID -19 pandemic	282	94.00
3	Yuen and Ma [16]	Exploring teacher acceptance of e-learning technology	220	13.75
4	Pal and Vanijja [28]	Perceived usability evaluation of Microsoft Teams as an OLP during COVID-19 using system usability scale and TAMin India	154	38.50
5	Almusharraf, et al. [29]	Students' Satisfaction with Online Learning Experiences during the COVID-19 Pandemic	127	31.75
6	Nawrot and Doucet [30]	Building engagement for MOOC students: Introducing support for time management on OLPs	116	11.60
7	Jiang, et al. [31]	Overcoming overconfidence in learning from video-recorded lectures: Implications of interpolated testing for online education	94	9.40
8	Clark, et al. [32]	Compensating for academic loss: Online learning and student performance during the COVID-19 pandemic	92	30.67
9	Abuhassna, et al. [19]	Development of a new model on utilizing OLPs to improve students' academic achievements and satisfaction	86	21.50
10	Zachos, et al. [33]	Social media use in higher education: A review	82	13.67
11	Jiang, et al. [31]	Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between Eastern and Western Chinese universities	80	26.67
12	Al-Kumaim, et al. [34]	Exploring the impact of the covid-19 pandemic on university students' learning life: An integrated conceptual motivational model for sustainable and healthy online learning	78	26.00
13	Heggart and Yoo [35]	Getting the most from google classroom: A pedagogical framework for tertiary educators	78	13.00
14	Yang and Su [36]	Learner behaviour in a MOOC practice-oriented course: In empirical study integrating TAM and TPB	72	10.29
15	Fischer, et al. [23]	Transition in learning during COVID-19: Student nurse anxiety, stress, and resource support	70	23.33
16	Landrum [37]	Examining students' confidence to learn online, self-regulation skills and perceptions of satisfaction and usefulness of online classes	64	16.00
17	Liu, et al. [38]	OLPs: Reconstructing modern higher education	63	15.75
18	Prasetyo, et al. [24]	Determining factors affecting acceptance of e-learning platforms during the covid-19 pandemic: Integrating extended TAMand delone & mclean is success model	62	20.67
19	Landrum [37]	Factors Influence Students' Switching Behavior to Online Learning under COVID-19 Pandemic: A Push–Pull–Mooring Model Perspective	62	20.67
20	Albreiki, et al. [39]	A systematic literature review of student' performance prediction using machine learning techniques	58	19.33

Note: TC=total citations; C/Y=average citations per year.

3.8. Keywords Analysis

3.8.1. Co-Occurrence Analysis of Author's Keywords

To uncover the primary keywords in scientific research, we have conducted a co-occurrence analysis of author-assigned keywords. The analysis revealed that certain keywords, such as "online learning" (occurring 222 times with a total link strength of 268), "OLP" (found 121 times with a total link strength of 134), "e-learning" (occurring 104 times with a total link strength of 172), "covid-19" (having 95 occurrences with a total link strength of 153), "massive open online course (MOOC)" (appearing 76 times with a total link strength of 103), and "higher education" (occurring 46 times with a total link strength of 101), consistently emerge as pivotal themes in the realm of OLP (OLP) research. For a comprehensive overview, please refer to Table 13, which presents the top 20 author-assigned keywords.

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Table 13.
Top author's keywords.

Author Keywords	Total Publications (TP)	Link Strength (LS)	Percentage (%)
online learning	222	268	3.99
OLP	121	134	2.18
e-learning	104	172	1.87
covid-19	95	153	1.71
massive open online course (mooc)	76	103	1.37
higher education	46	101	0.83
blended learning	43	62	0.77
education	43	66	0.77
learning analytics	42	74	0.76
machine learning	37	58	0.67
online education	33	42	0.59
deep learning	27	44	0.49
covid-19 pandemic	26	33	0.47
distance learning	24	48	0.43
educational data mining	24	38	0.43
gamification	23	44	0.41
learning management system	20	35	0.36
student engagement	20	32	0.36
data mining	17	19	0.31
learning platform	17	20	0.31

Figure 6's overlay visualization illustrates the most prevalent author's keyword regarding OLP, providing insights into current research trends. During the purple phase (2018-2019), keywords such as "learner autonomy," "engagement," "UTAUT," and "engineering education" held prominence. Subsequently, in the green phase (2019–2020), "e-learning," "learning management system," "big data," and "blended learning" gained prominence. The light green phase (2020–2021) witnessed increased usage of terms like "online learning," "higher education," and "online education." Notably, the recent years from 2021 to 2023 (yellow phase) have seen a surge in keywords like "covid-19," "deep learning," "technology acceptance model," "neural network," "text mining," "sentiment analysis," "flipped classroom," "knowledge graph," "active learning," and "digital learning." This shift in keyword prevalence underscores the evolving focus of OLP research.

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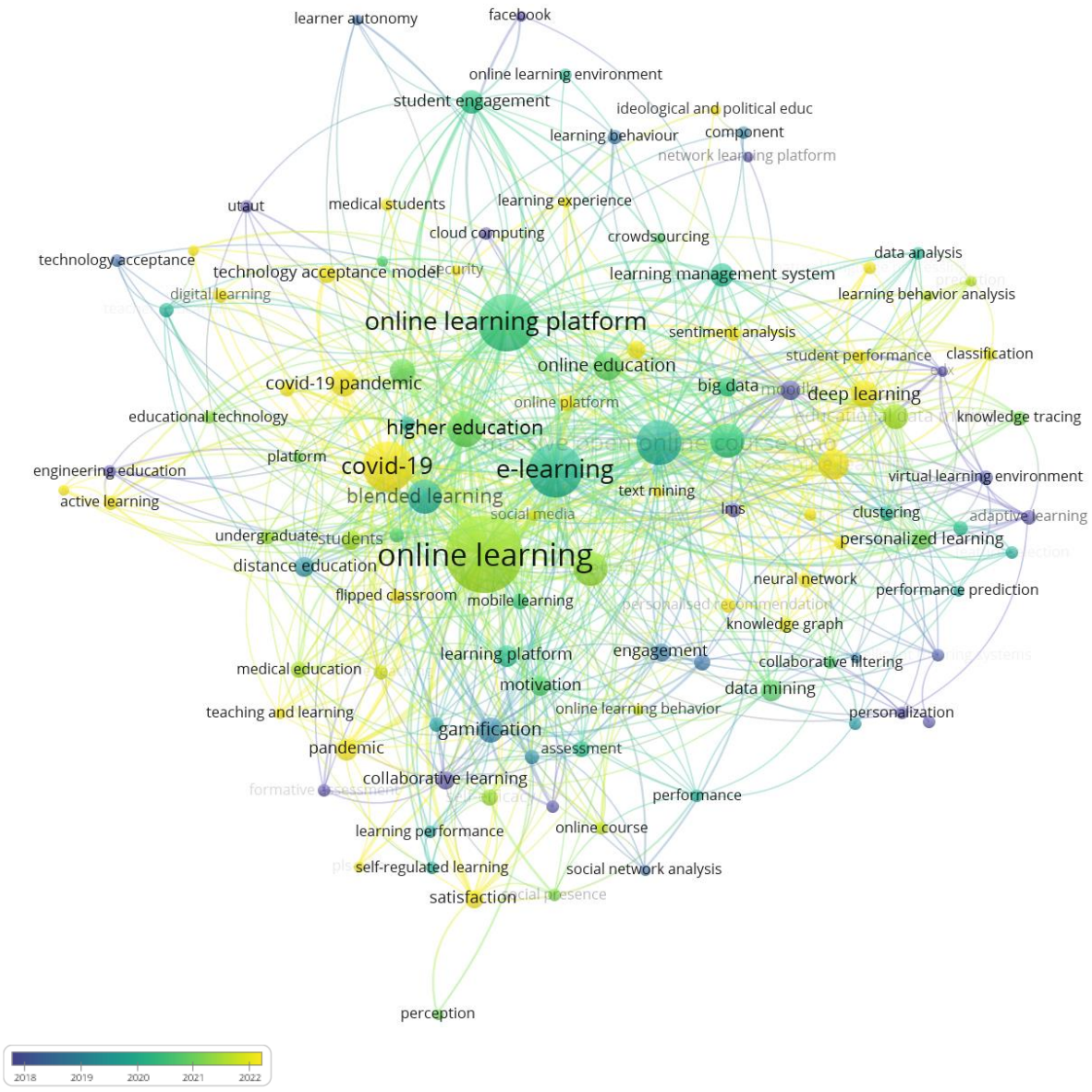

Figure 6.
Overlay visualisation of the author's keywords with minimum five keyword occurrence.

Table 14 and Figure 7 show the accumulation of trends based on the top ten author's keywords related to the OLP topic within the Scopus database over the years from 2006 to 2023. These keywords are essential indicators of the most discussed and researched topics in the field of online learning. Over this period, the usage of these keywords has steadily increased, reflecting the growing interest and importance of OLPs, e-learning, and related topics. "Online Learning" and "online learning platform" have shown a substantial rise in mentions, with a significant spike starting from 2010 onwards, demonstrating the surge in interest in this area. "E-Learning," "Covid-19," and "Massive Open Online Course (MOOC)" also exhibit noticeable growth, particularly during the past few years, indicating their relevance. The keyword "COVID-19" was not mentioned in research up to and including 2019. However, it began to be prominently featured from 2020, with a significant increase in its usage.

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"Higher Education," "Blended Learning," and "Education" maintain a consistent presence, underlining their enduring importance in the field. The keywords "Learning Analytics" and "Machine Learning" have shown a gradual but consistent increase in mentions, suggesting a growing focus on data-driven approaches and technological advancements in online learning. This table provides valuable insights into the evolving landscape of online learning and the key areas of research and development within this field.

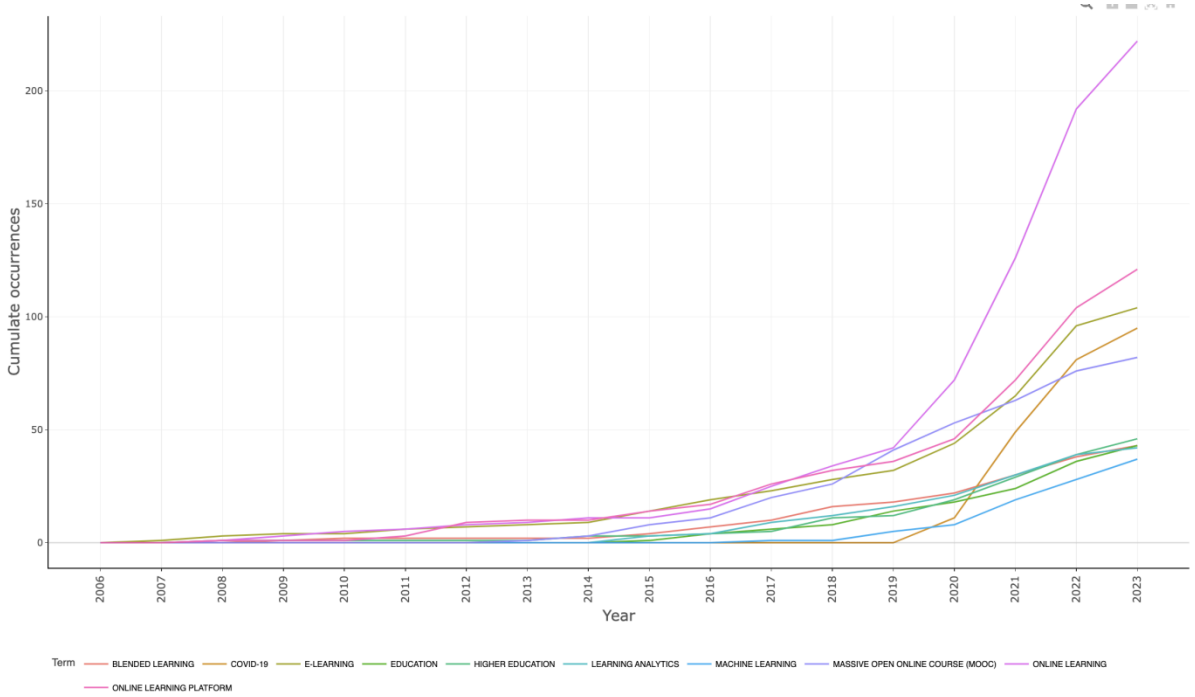

Figure 7.
Trend of the top ten author's keywords.

Table 14.
Accumulation number of trend based on the top ten author's keywords.

Year (20')	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Online Learning	0	0	1	3	5	6	8	9	11	11	15	25	34	42	72	126	192	222
OLP	0	0	1	1	1	3	9	10	10	14	17	26	32	36	46	72	104	121
E-Learning	0	1	3	4	4	6	7	8	9	14	19	23	28	32	44	65	96	104
Covid-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	49	81	95
Massive Open Online Course (Mooc)	0	0	0	0	0	0	0	1	3	8	11	20	26	41	53	63	76	82
Higher Education	0	0	1	1	1	1	1	1	3	3	4	5	11	12	19	29	39	46
Blended Learning	0	0	0	1	2	2	2	2	2	4	7	10	16	18	22	30	38	43
Education	0	0	0	0	0	0	0	0	0	1	4	6	8	14	18	24	36	43
Learning Analytics	0	0	0	0	0	0	0	0	0	3	4	9	12	16	21	30	39	42
Machine Learning	0	0	0	0	0	0	0	0	0	0	0	1	1	5	8	19	28	37

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3.8.2. Co-Occurrence Analysis of Terms Based on Title and Abstract

Table 15 displays the top 50 keywords extracted from the titles of research articles related to the topic of OLPs, as sourced from the Scopus database. The top 50 keywords extracted from the titles of academic publications related to OLPs provide valuable insights into the core themes of this field. These keywords can be organized into several clusters that reveal the underlying trends and topics. One prominent cluster centers on the learning process, including keywords such as "learning," "students," "teaching," and "courses." This indicates a focus on how students engage with online education. Another cluster pertains to online education itself, highlighting terms like "online," "platform," "technology," and "virtual." This signifies the digital and virtual aspects of modern education. Additionally, there is a research and analysis cluster with keywords such as "study," "analysis," "data," and "research," underlining the importance of data-driven research in OLPs. The impact of the COVID-19 pandemic on education is also evident in a dedicated cluster featuring "COVID-19" and "pandemic." Finally, there are clusters emphasizing educational platforms and keywords associated with higher education institutions. Clustering these keywords helps us discern the prevailing trends and areas of interest within the broader domain of OLPs, which can be invaluable for researchers, educators, and policymakers seeking to stay informed about this evolving field. The network connecting all the keywords can be referenced in Figure 8.

Table 15.
Table of keyword based on title fields.

No.	Keywords	Occurrences	No.	Keywords	Occurrences
1	Learning	726	26	Development	50
2	Online	620	27	Educational	46
3	Platform	211	28	Evaluation	45
4	Students	199	29	Virtual	44
5	Education	173	30	Network	44
6	Based	169	31	Engagement	43
7	Covid-	135	32	Environment	43
8	Study	116	33	Impact	43
9	Teaching	115	34	University	43
10	Analysis	115	35	Digital	42
11	Pandemic	101	36	College	42
12	Platforms	95	37	Behavior	41
13	Student	83	38	Recommendation	41
14	Data	82	39	Application	40
15	Model	82	40	Approach	38
16	System	72	41	Classroom	38
17	Technology	71	42	Language	37
18	Research	67	43	Blended	37
19	Design	63	44	Training	36
20	Performance	56	45	School	36
21	Learners	54	46	Factors	35
22	English	54	47	Distance	33
23	Knowledge	54	48	Information	33
24	E-learning	52	49	Social	32
25	Courses	51	50	Academic	32

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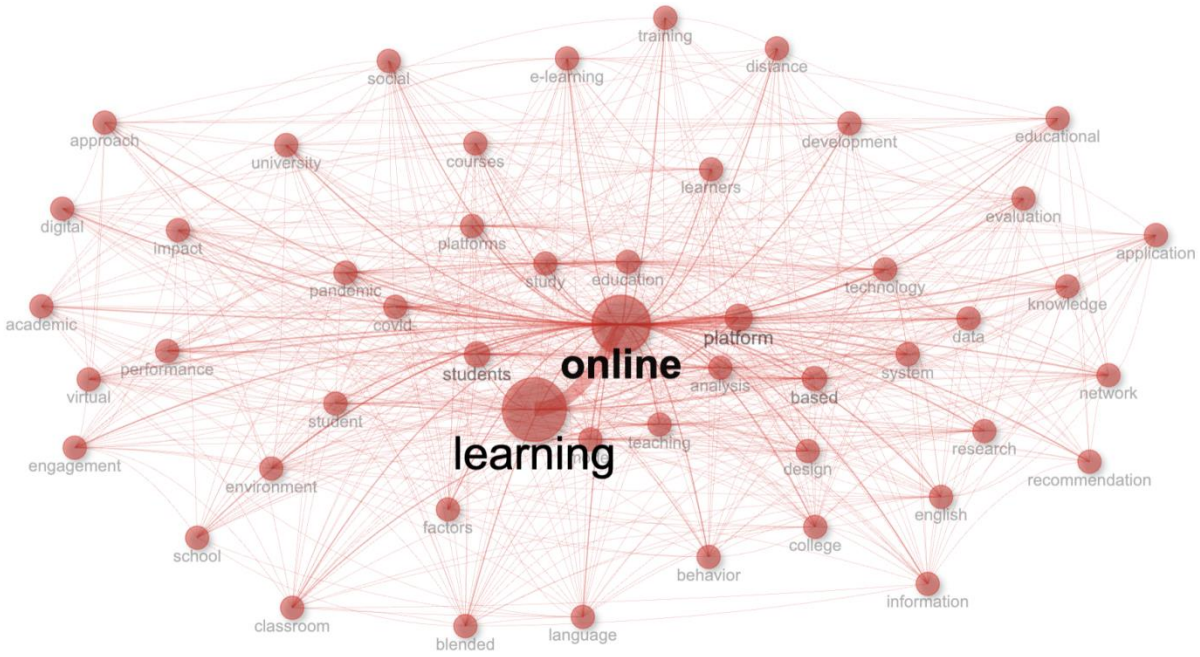

Figure 8.
Network visualisation of a term co-occurrence network based on title fields.

Table 16 presented here is a comprehensive listing of the top 50 keywords, extracted from abstracts in the field of OLPs, based on data from the Scopus database. This collection of keywords reflects the most commonly occurring terms and phrases found within the abstracts of academic papers, research articles, or studies that are closely related to the topic of OLPs. The top 50 keywords, derived from abstracts in the field of OLPs using data from the Scopus database, can be effectively clustered into several thematic categories. The first cluster revolves around pedagogy and learning styles, encompassing terms such as "learning," "teaching," and "students," emphasizing the educational aspects and student-centric focus within the field. Another cluster centers on online learning technologies, featuring keywords like "online" and "platform," highlighting the critical role of technology in modern education. Research and analysis form a distinct cluster with terms like "research," "analysis," and "data," underlining the importance of data-driven insights and empirical research. The cluster of educational systems and quality includes terms such as "education," "system," and "quality," emphasizing the significance of well-structured educational systems and the pursuit of quality education. Furthermore, an academic context and collaboration cluster bring together terms like "university," "academic," and "teachers," emphasizing the academic environment and collaborative efforts within education. A noticeable cluster is related to the impact of the COVID-19 pandemic with terms like "covid-" and "pandemic," reflecting the transformative impact of global events on education. Content and course development cluster includes "paper," "model," and "courses," underscoring the significance of developing course content and materials. Lastly, a performance and improvement cluster incorporate keywords such as "results," "performance," "improve," and "support," focusing on enhancing the quality and outcomes of online education. In addition, a social and user interaction cluster gathers keywords like "social," "users," and "engagement," highlighting the importance of social aspects and user engagement in online learning. These clusters provide valuable insights into the diverse and interconnected themes that shape the discourse surrounding OLPs. The network connecting all the keywords can be referenced in Figure 9.

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Table 16.
Table of keyword based on abstract fields.

No.	Keywords	Occurrences	No.	Keywords	Occurrences
1	learning	1308	26	teachers	285
2	online	1294	27	design	271
3	students	825	28	university	265
4	platform	792	29	covid-	263
5	platforms	736	30	process	260
6	study	652	31	authors	259
7	education	586	32	performance	252
8	results	568	33	provide	245
9	data	528	34	pandemic	240
10	paper	473	35	content	234
11	research	462	36	method	224
12	based	446	37	improve	222
13	teaching	425	38	support	221
14	technology	357	39	approach	213
15	model	356	40	time	209
16	educational	351	41	quality	193
17	analysis	342	42	resources	187
18	system	314	43	experience	185
19	student	311	44	social	178
20	development	311	45	users	167
21	information	308	46	academic	164
22	learners	300	47	network	160
23	knowledge	300	48	training	147
24	courses	292	49	e-learning	129
25	methods	288	50	engagement	122

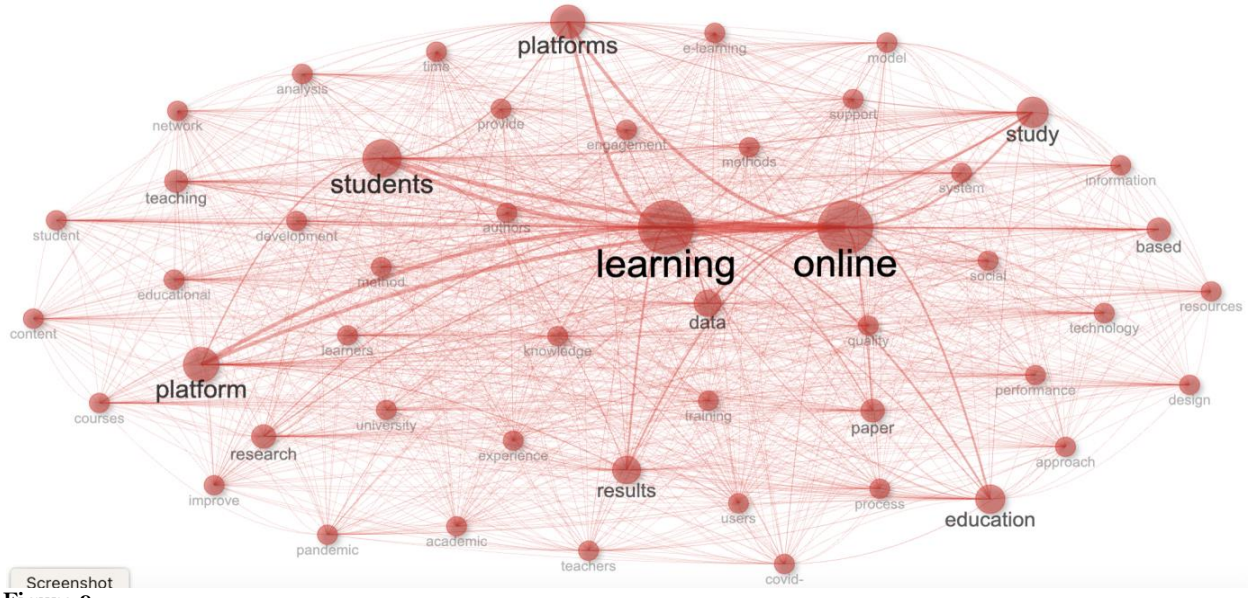

Figure 9.
Network visualisation of a term co-occurrence network based on abstract fields.

4. Discussion

Due to the recent surge in interest in OLP studies, this bibliometric analysis of OLP research clearly underscores the substantial volume of publications in this field, underscoring the need for further

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research in the OLP domain. The noteworthy contributions of previous scholars over the past two decades have been acknowledged. While earlier studies and related keywords increasingly emphasize the significance of OLP research, it is evident that future scholars should adopt a more critical perspective on the ongoing discourse, particularly concerning the research clusters that warrant attention to address the current substantial gap. Furthermore, this study reveals a substantial surge in OLP research, particularly since the onset of the COVID-19 pandemic. During the pandemic, countries worldwide implemented movement control measures to curb the outbreak, rendering traditional face-to-face knowledge delivery impractical. As a result, OLPs became the primary, if not the sole, viable means of education during the pandemic. Consequently, the study of OLP has become closely intertwined with the context of the COVID-19 pandemic.

While previous studies have primarily focused on bibliometric analysis pertaining to the tools of OLP [10, 11] this study offers a novel perspective by conducting a comprehensive analysis of the entire spectrum of OLP-related topics. As highlighted earlier, the findings of this study hold value not only for academicians and researchers but also for stakeholders in the OLP domain, including the education industry and government entities. Government agencies, for instance, have significant opportunities to enhance their initiatives supporting the development of learning platforms in rural areas, addressing challenges such as a shortage of teachers and facilities. The Malaysian government, for example, has introduced initiatives like Starlink to provide internet access in remote areas [40]. As illustrated by the network analysis findings, there are numerous areas where policymakers can direct their efforts, including the enhancement of online learning strategies through the application of technologies such as machine learning, learning analytics, deep learning, and other online learning approaches.

5. Conclusion

This research paper employs a rigorous bibliometric analysis, utilizing VOSviewer and R software, to systematically chart the historical development and present status of OLP. The analysis encompasses a thorough examination of pertinent article characteristics, encompassing publication years, article types, source origins, and document contents. Furthermore, the bibliometric analysis reveals vital insights into the annual publication patterns, the most prolific authors, highly cited papers, leading nations, prominent academic institutions, source titles of note, prevalent keywords, co-citation networks, collaborative patterns, and the evolving landscape of critical keywords within the field of OLP. In summary, this innovative bibliometric analysis represents a pioneering endeavour in the realm of OLP research. It significantly contributes to the scholarly discourse by pinpointing areas of paramount importance for future investigations. This comprehensive bibliometric review enriches our comprehension of the multifaceted facets of OLP, shedding light on their historical utilization and future trajectories.

This study yields invaluable insights with profound implications for educators, practitioners, academics, and scholars engaged in the realm of education and learning. Through a meticulous examination of the literature via bibliometric analysis, we have unveiled the ever-evolving landscape of OLP over the years. Nevertheless, it is imperative to acknowledge the limitations inherent in this research. One primary constraint pertains to the utilization of keywords for article retrieval. Given that our search strategy hinged on the term "online learning platform" we cannot assert comprehensive coverage of every published work within the field. However, we maintain that, with the chosen keywords, this study has effectively encompassed a substantial body of literature pertaining to OLP. Another noteworthy limitation lies in the sole reliance on the Scopus online database as the principal source for bibliometric analysis. This database choice could potentially constrain the scope of our search. Therefore, we encourage future scholars to consider diversifying their review databases and integrating bibliometric techniques to enhance the comprehensiveness of their work. Prospective researchers are encouraged to build upon this foundation, delving deeper into specific facets such as the examination of OLP tools like the TAM and the UTAUT, among others. Moreover, we propose extending

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investigations to encompass varied terms, such as e-learning and online learning, and exploring diverse contexts, including the public and private sectors, non-governmental organizations, and community-based initiatives. Furthermore, future inquiries may delve into cutting-edge issues in technological advancements within online learning, including machine learning, deep learning, and learning analytics. The ever-evolving digital landscape in OLP holds the promise of unveiling novel insights in the contemporary learning landscape. This proposition resonates with the recommendation by Chen, et al. [22] that the study of information technology and digitalization stands as a preeminent emerging research area in this field. Hence, we advocate for forthcoming research endeavors to explore these burgeoning dimensions within OLP. Research encompassing quantitative, qualitative, and experimental approaches to technology application promises to yield substantial contributions to this field.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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