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Online Learning in Malaysia amidst COVID-19 Pandemic (2020-2022): A Bibliometric Analysis

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Abstract

The purpose of this study was to use the Scopus database to conduct a bibliometric analysis of 4229 publications published in online Learning in Malaysia between 2020 and 2023. The study's goals are to shed light on how researchers from different institutions are working together, to name the most influential authors, universities, countries, and reference papers, to reveal the areas of study that have seen the most activity in recent years, and to analyze Malaysia's contribution to the field. According to the results, the most successful nations in terms of online education are Malaysia, Indonesia, the United States of America, and Australia. The leading authors and online-learning researchers are Chung and Subramaniam. At the time of COVID-19, the National University of Malaysia was the undisputed leader in research on e-learning in Malaysia. The most widely published journals are the International Journal of Advanced Computer Science and Applications and the Asian Journal of University Education. Based on the findings, the author, university, and country collaboration on Online Learning is at a medium level, and COVID-19 highly influences distance education.

Keywords

Bibliometric, Online Learning, Malaysia, COVID-19, Pandemic

1. Introduction

The WHO first reported the coronavirus epidemic on January 30, 2020. Since then, campuses throughout the globe have been shuttered, hastening an unfo-

reseen shift toward online Learning (Aggarwal & Elembilassery, 2022; Ng, Ching, & Law, 2023). The academic management community resisted embracing new methods of instruction in the first two years of online Learning, including distance learning, blended instruction, and self-directed study (Garaus et al., 2016; Whitaker et al., 2016). Both enterprises and other organizations, such as government agencies, must utilize an online learning platform as a supplementary training tool (Greenberg & Hibbert, 2020; Sriharan et al., 2021). This means that teachers will need to update their technology skills. There is a wealth of recent studies examining many aspects of online education (e.g., management, pedagogy, technology support, learning outcomes, and digital skills) to understand better how the web has affected management education.

COVID-19 has significantly impacted students, teachers, and educational institutions worldwide (Mailizar, Almanthari, Maulina, & Bruce, 2020), as it has on virtually every other part of modern life. During the outbreak, campuses worldwide were shut down so students could practice isolation. However, it would have been impossible to transition from a traditional classroom setting to one that incorporated distance and online instruction overnight. Some problems and difficulties arising from this rapid change have been identified (Crawford et al., 2020). Due to the uncertainty of the pandemic's end date, universities and colleges worldwide have pooled their existing technological resources to develop online educational content for students in all disciplines (Kaur, 2020; Adnan & Anwar, 2020).

Starting from this event, the learning method changed completely from face-to-face to a new online learning method. The emergency has necessitated the replacement of classrooms with online and remote education for both students and teachers. They must overcome significant obstacles to successfully transition from traditional classroom techniques to those that take advantage of technological innovations in the online learning space (Chiu, Lin, & Kolonka, 2021). The epidemic highlights the pressing requirement to improve the educational system's technology infrastructure, increase the teachers' pedagogical knowledge, and broaden the students' learning repertoire. Researchers and practitioners in the field of online Learning, therefore, need to re-evaluate the roles of educators, students, and the technological infrastructure to better address the epistemological foundations of education (Tsai et al., 2013). These growing concerns have never been so obvious during this crucial juncture. Consequently, researchers must immediately and critically examine and enhance online education by employing more effective designs and evidence-based methodologies.

2. Online Learning in Malaysia during the COVID-19 Pandemic

At the time, just a select few colleges and institutions provided online education. Students can save time and energy by taking advantage of online learning opportunities, especially for those working while attending school. Virtually any topic may be studied, and students can adjust their schedules to fit their needs

with the convenience of online education. Part-time students prefer online courses to traditional classroom settings. Students who wish to study abroad but cannot leave their home countries could take advantage of online courses to get the education they need (Salleh, Ghazali, Ismail, Alias, & Rahim, 2020).

The government of Malaysia actively promotes the use of technology among the country's youth and provides them with accessible, practical instruction. Student participation in the online higher education network will improve as a result of the government's vigorous endeavour (Ullah, Nawi, Shahzad, Khan, & Aamir, 2017; Mustapha et al., 2021). To foster "One Malaysia" and a robust e-learning infrastructure, the Malaysian government has mandated a new economic model (Model Baru Ekonomi-MBE) for universities and colleges (Zain, Aspah, Abdullah, & Ebrahimi, 2017). LMS, content management systems, and resource management make up electronic Learning. As education technology evolves, many ICT specialists add online learning tools to the classroom. Internet technology affects student and educator performance by connecting teachers and students to learning resources. The Malaysian Ministry of Higher Education supports Open and Distance Learning as well. Students in Malaysian universities would benefit from a "blended learning" environment in which online and in-person instruction are combined (Tayebinik & Puteh, 2013). This is accomplished through the use of Learning Management Systems (LMS). Higher education institutions employ LMSs to create, implement, and administer blended learning models. LMSs like Moodle and Blackboard offer student tracking, group work, and online training (Pellas & Kazanidis, 2015). Malaysian universities' most used LMS elements are communications, classrooms, efficiency, quality, and administration. Few colleges include LMS features like community and portfolios encouraging student involvement (Hussin, Embi, & Atan, 2011).

As a result of the pandemic, Malaysia is also suffering. After the epidemic broke out, all of the schools were closed. Numerous universities and colleges today still use the Internet extensively for instructional purposes. However, many teachers in the modern world favour in-person classes. The application of this online Learning has many obstacles in Malaysia due to the country's diverse population. The deployment of online Learning faces significant difficulties in areas with hilly terrain, isolated locations, villages, and limited or no internet access. Similarly, research has found that students find traditional lectures to be an intimidating and unpleasant experience overall (Mustapha et al., 2021).

Malaysia joined numerous other countries in enforcing the Movement Control Order (MCO) to halt the spread of the COVID-19 virus. The Malaysian Ministry of Higher Education has mandated that all universities in the country, both public and private, must switch to online education by the end of 2020. The academic community responded to MCO's issues with remarkable fortitude, agility, and initiative. It's undeniable that online Learning is the best solution to ensure continuity in learning in the era that's been dubbed the "new norm," but it's also possible that it has some drawbacks, such as the inability to sense stu-

dents' incomprehension through facial expressions, the ability to crack small jokes to enlighten mood, and the ability to engage and interact with students more effectively. Modern students confront challenges such as a decline in social connection and the inability to easily organize study groups (Zeng & Wang, 2021).

This study aims to apply bibliometric and graphical analysis to the online learning research published between 2020 and 2022 in Malaysia. In addition, all of the information used in this study came from online sources, particularly Google Scholar. This study also used the results of previous research to display and explore scientific collaborations among leading contributors in online Learning. The following set of research questions was our only focus:

1) What is the trend of publication of Online Learning amid COVID 19 in Malaysia?

2) What major educational institutions publish online learning research in Malaysia in the Scopus database?

3) What is the dominant subject area published in online Learning in Malaysia?

4) Who are the most influential authors and publishers?

5) What are the most popular search terms related to online education in Malaysia, as recorded by the Scopus database?

6) What is co-authorship and countries collaborations?

3. Methodology

Using bibliometric analysis, the reader can get a big-picture view of the research topic over a certain period (Gokhale et al., 2020). Following the principles laid out by PRISMA (Tortosa et al. 2023), we used a bibliometric approach. Scopus database was used to locate applicable research. A bibliometric analysis of the literature on "e-learning" and "Malaysia" has been conducted to answer the research question. The analysis is split into two parts: the first uses bibliometric mapping to track developments in the field of online Learning; the second employs keyword analysis to compare the methods employed by researchers in different fields to answer the same questions about online education in Malaysia throughout the study period covered by the COVID-19 database.

The current research on online learning in Malaysia amidst COVID-19 from 2020 to 2022 was mapped using bibliometric analysis and the Scopus database. Scholarly works that provide an update on the state of online learning have frequently used bibliometric analysis (e.g., Huang et al., 2020; Ng et al., 2022). Important educational academics and their current research areas could be identified. It might also be able to realize author profiles and collaborative networks. It also aids in developing bibliometric indexes, which are used to evaluate academic output and identify new areas of study interest; furthermore, it draws conclusions about potential avenues for future research. A study was conducted by Chen et al. (2023).

3.1. Data Sources (Obtaining Data Set)

In this study, our research relied on the breadth and quality of coverage provided by the bibliographic SCOPUS database. Scopus was used to sample the most relevant articles on "Online-learning" from the Web of Science Core Collection for 2020 through 2022.The following database search query was built and executed: (online AND learning AND Malaysia AND covid-19) AND (PUBYEAR = 2022 OR PUBYEAR = 2021 OR PUBYEAR = 2020). On May 12, 2023, we consulted SCOPUS and retrieved 4229 articles.

3.2. Data Analysis

In this bibliometric study, we used the VOSV viewer bibliometrics application. In-depth bibliometric studies can benefit greatly from their various aspects. This web app provides access to bibliometric 3.1.4's capabilities (Aria & Cuccurullo, 2017). The study of bibliometrics may be broken down into two main parts. The first step is an evaluation and description of the performance. This research provided contextual information on a wide range of materials. Annual and accumulated citation and study counts were also calculated. The most quoted research then got some attention. Scientific mapping and network theory constituted the second set of analyses. A document clustering analysis by author and keyword was carried out. Brief introductions to each subtopic of online formative testing are offered. Network analysis was used to examine the connections between things, such as countries and authors.

4. Findings

Analyses of bibliometric metadata, including authorship, bibliographic coupling, keyword co-occurrence, and citation, were performed using the VOSViewer programme. Links between objects like publications, journals, and authors are determined by the number of times the same article is cited in both sources (bibliographic coupling).Keyword co-occurrence analysis can provide insight into the evolution of a domain (Deng & Xia, 2020). Therefore, it is an effective strategy for locating current trends in a particular field of study. Researchers can learn about trending areas of study by analyzing citation data (Lai, 2020). Tables or network visualization maps are used to display the following analysis results.

According to the findings, between 2020 and 2022, researchers in Malaysia generated a total of 4229 studies on the topic of online education. We shall respond to the researcher's inquiries that have been predicated on the findings of this investigation. The following study is based on the first question, "What is the trend of publication of Online Learning amid COVID-19 in Malaysia?" the finding from the analysis are as follows.

Based on Figure 1 and Table 1, the data shows the publication trend in studies related to online Learning in Malaysia, showing a significant increase. In 2020, 372 studies were published; in 2021 = 2107 studies; in 2022 = 4275 studies. This conclusion highlights the importance of online learning studies, which
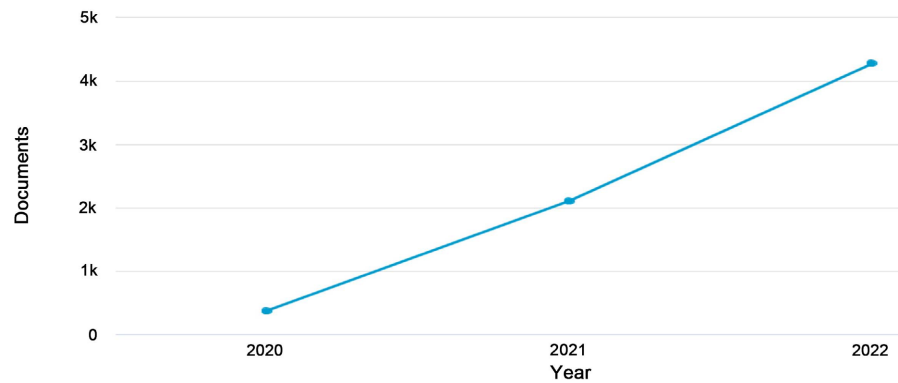
Figure 1. The trend of publication of Online learning research in Malaysia amidst COVID-19 (2020-2022).

Table 1. The trend of publication of online learning research in Malaysia amidst COVID-19 (2020-2022).

| Year	Documents
2020	372
2021	2107
2022	4275

Sources: Scopus database.

scholars in Malaysia are aggressively pursuing. Considering that at that time, Covid was looming and all Learning was carried out at home, and the need for online Learning was very strong, researchers actively carried out studies to see the problems, needs, and various other problems that arose.

To answer the second research question, "What major educational institutions publish online learning research in Malaysia in the Scopus database?" the findings are as follows.

Based on Figure 2 and Table 2, the data shows that the institutions that excel in studies related to online Learning in Malaysia are Universiti Kebangsaan Malaysia (National University of Malaysia) with 349 studies, Universiti Sains Malaysia (Science University of Malaysia) with 319 studies, MARA University of Technology (UiTM) with 295 studies, Universiti Malaya (University of Malaya) with 295 studies, University Teknologi Malaysia (Technology University of Malaysia) with 246 studies, Universiti Putra Malaysia (Putra University of Malaysia) with 226 studies, Universiti Utara Malaysia (Northern University of Malaysia) with 145 studies, UPSI (Sultan Idris Teaching University) with 128 studies, Taylors University of Malaysia with 112 and UCSI University with 100 studies.

Next, to answer the third and fourth questions of the study, "*What is the dominant subject area published in online learning in Malaysia?*" by referring to the following data:

Regarding the subject area, most of the studies focused on the field of social science (23.0%), followed by other fields (16.8%), Computer Science (15.6%),
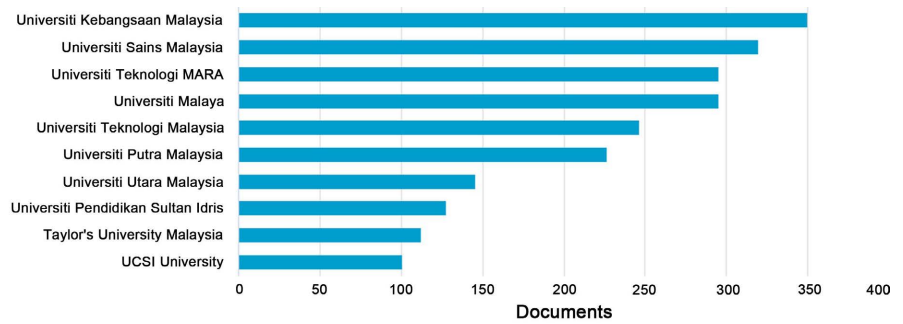
Figure 2. Top Malaysian institution published online learning research.

Table 2. Affiliation.

Affiliation	document
Universiti Kebangsaan Malaysia	349
Universiti Sains Malaysia	319
Universiti Teknologi MARA	295
Universiti Malaya	295
Universiti Teknologi Malaysia	246
Universiti Putra Malaysia	226
Universiti Utara Malaysia	145
Universiti Pendidikan Sultan Idris	128
Taylor's University Malaysia	112
UCSI University	100

Engineering (9.4%), Business & Management (8.5%), Medicine (7.2%), Environment (5.6%), Psychology (3.9%), Energy (3.5%), Decision Science (3.5%) and Economic (3.2%) (see Figure 3). Based on this data, we can see that research related to online Learning is done in various fields and not only focused on one important field. This may be the effect of covid covering all fields of study affected by covid-19. To see which author is the most cited is based on Table 3. The most cited authors are Chung & Subramaniam (541 citations), followed by Kamal, Shaipoullah, Truna & Sabri (147 citations), Salleh, Ghazali, Ismail & Alias (50 citations), Karuppanan & Mohammaed (35 citations), Thandevaraj, Gani & Nasir (33 citations), Razaami & Ibrahim (26 citations), Zuky & Baharudin (26 citations), Nordin & Nordin (16 citations) and Munir, Anwar & kee (15 Citation) see Table 3.

Table 4 shows the top publishers who published studies related to Online Learning in Malaysia during COVID-19. Occupying the top ranking is the Asian Journal of University Education (1180.3 CPY, 180 CPA), International Journal of Advanced Computer Science and Applications (147 CPY, 29 CPA), Journal of Critical Reviews (16.67 CPY, 10 CPA), International Journal of Management and Human Sciences (11.67 CPY, 10 CPA), International Journal of Management and Human Sciences (11.67 CPY, 18 CPA), Creative Education (16.5 CPY, 11 CPA), International Journal of Advanced Computer Science and Applications
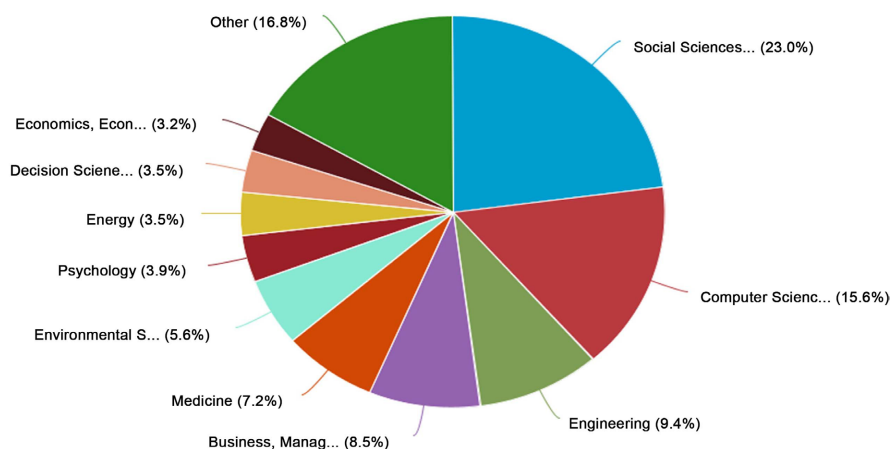
Figure 3. Document by subject area.

Table 3. Most cited authors.

Authors	Title	Cites
E Chung, G Subramaniam, ...	Online learning readiness among university students in Malaysia Amidst COVID-19	541
AA Kamal, NM Shaipullah, L Truna, M Sabri, ...	Transitioning to Online Learning During COVID-19 Pandemic: Case Study of a Pre-University Centre in Malaysia	147
FIM Salleh, JM Ghazali, W Ismail, M Alias, ...	The Impacts of COVID-19 through online learning usage for tertiary education in Malaysia	50
S Karuppannan, LA Mohammed	Predictive factors associated with online Learning during COVID-19 pandemic in Malaysia: A conceptual framework	35
EJ Thandevaraj, NAN Gani, MKM Nasir	A Review of psychological impact on Students' Online Learning during covid-19 in Malaysia	33
HH Razami, R Ibrahim	Distance education during the COVID-19 pandemic: The perceptions and preference of university students in Malaysia towards Online Learning	26
NL Nik-Ahmad-Zuky, KA Baharuddin, ...	Online clinical teaching and Learning for medical undergraduates during the COVID-19 Pandemic: The Universiti Sains Malaysia (USM) Experience	26
NH Nordin, NN Nordin	Impact of Pandemic COVID-19 the Online Learning: Case of Higher Education Institution in Malaysia.	16
F Munir, A Anwar, DMH Kee	Online Learning and Students' Fear of COVID-19: Study in Malaysia and Pakistan	15

Table 4. Top publisher.

Source	ECC	Cites Per Year	Cites Per Author
Asian Journal of University Education	541	180.33	180
International Journal of Advanced Computer Science and Applications	147	49	29
Journal of critical review	50	16.67	10

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Continued

International Journal of Management and Human Sciences	35	11.67	18
Creative Education	33	16.5	11
International Journal of Advanced Computer Science and Applications	26	13	13
Education in Medicine Journal	26	8.67	9
Universal Journal of Educational Research	16	5.33	8
International Review of Research in Open and Distributed Learning	15	7.5	5
Pioneer: Journal of Language and Literature	12	4	4

CPA, Cite Per Author; CPY, Cite per year.

(26 CPY, 13 CPA), Education in Medicine Research (8.67, CPY, 9 CPA), Universal Journal of Education Research (5.33 CPY, 8 CPA), International review of Research in Open and Distributed Learning (7.5 CPY, 5 CPA) and Pioneer: Journal of Language and Literature (4 CPY, CPA 4).

Then we analyze the keywords (themes) discussed in online learning studies in Malaysia in general. In this section, we will try to answer the question, "*What is the most frequently used keywords in online Learning in Malaysia research in the Scopus database?*" We will assess based on network visualization map (co-occurrence) analysis. Co-citation analysis examined how frequently the same sources appeared in each study's reference list. The thicker the lines are, the more frequently they are used, and the larger the circle, the more frequently it is used. Keywords associated with studies of Online Learning in Malaysia during COVID-19 cover many topics. Figure 4 demonstrates the prevalence of interrelated topics in discussions on Online Learning in Malaysia during COVID-19. Figure 4 analysis reveals a wide range of topics being covered.

There are 7 clusters, 721 items, 33,565 with total links and 84,195 total link strength. The following table (See Figure 4). Red represents the largest cluster with 251 terms. Words like e-learning, learning system, higher education, social media, computer aids, sustainability development and technology are highlighted. In addition, the colour green ranks second with 284 topics. The main things discussed meaningfully, such as attitude, disease spread, patient care, virus transmission and vaccination, are often discussed. The blue 3rd largest cluster, with 219 words. The matters discussed in cluster 3 are coping behaviour, clinical studies, mental health, social support, anxiety, depression and risk factors. Besides that, the cluster is strengthened, which is the fourth cluster which is yellow with 185 words. Among those discussed are attitude, trust, patient care, personnel, income and infection risk. Besides, the purple clusters explain 100 words, including students, learning, education, Internet, knowledge and education distance.

Various researchers in Malaysia make studies related to Online Learning. Among them, there is a relationship with each other in studies related to OL in Malaysia. Based on Figure 5, from a large number of researchers, important groups are composed of two groups where the first group contains 4 authors (Nobane, Zain, Awan and Yasin), while the second group contains 3 authors (Mohammaed, Ahmed and Abdulzeez) see Figure 5.
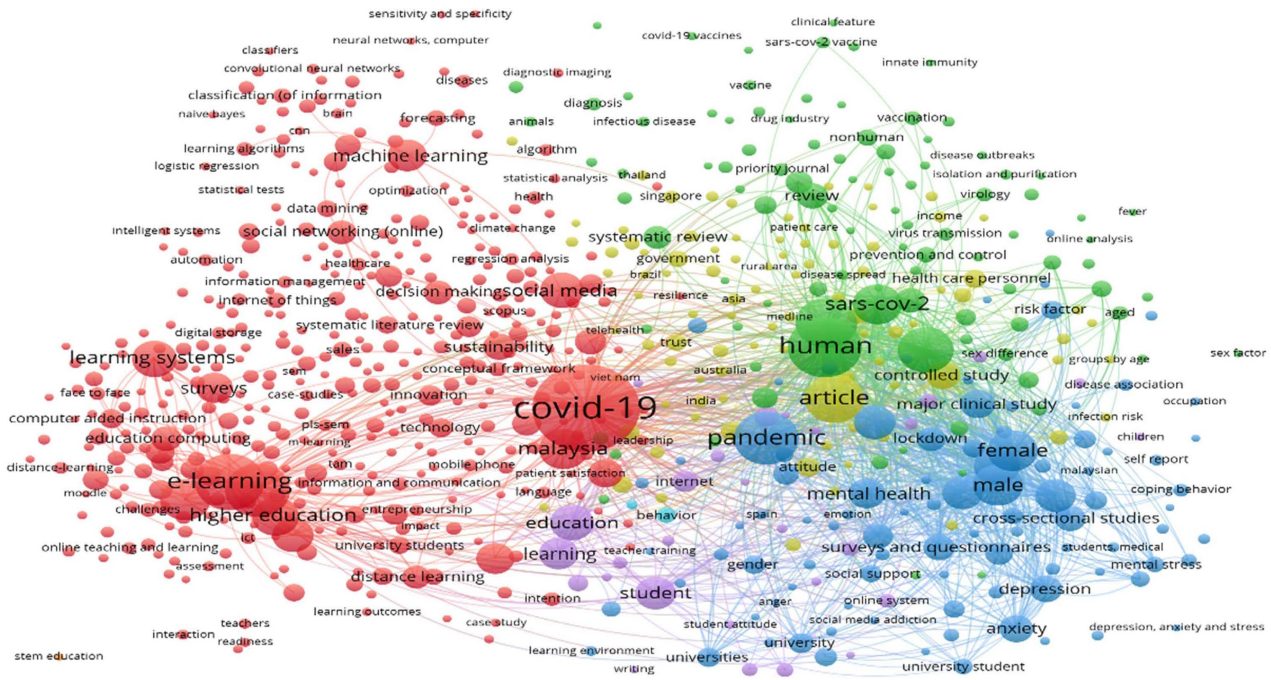
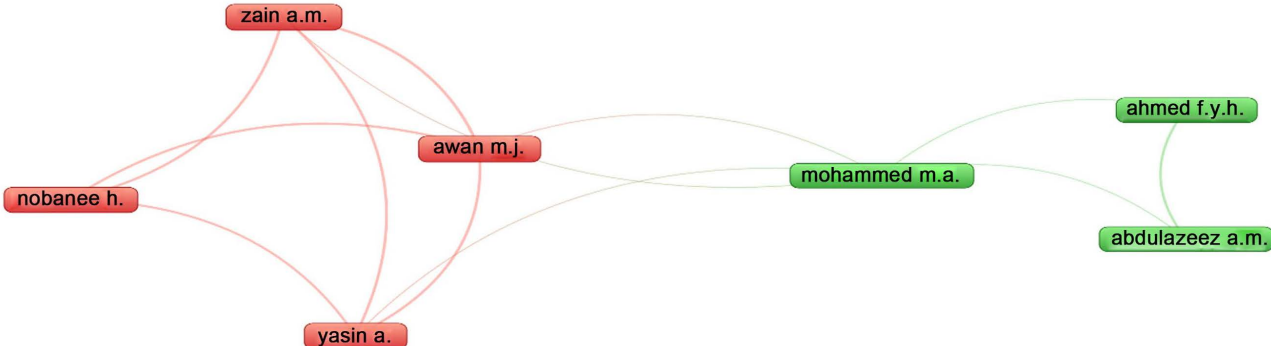**Figure 4.** Network visualization map of keywords' co-occurrence.

Figure 5. Co-Authorship network.

Figure 6 displays the nations where authors work together on online-learning research. Researchers worldwide cooperate on online-learning projects, as seen by the similarities between the clusters representing the countries where authors collaborate the most. Most countries at the end of the graph, with minimal co-operation between neighbouring nodes, are among the world's poorest. Total link strength (TLS) values show that Malaysia, Indonesia, USA, Australia, Spain, Canada, Taiwan (China), Thailand, Netherlands, Italy, Brazil, Singapore, Sweden, Japan, New Zealand and Belgium are the most influential countries/region in collaboration. Surprisingly, there are more developed countries/region in the same group as third-world countries/region, such as Greece, Poland, Switzerland, Norway, and Denmark, in the same group as Yemen, Uganda, Kenya, Chile, Mexico, Macau (China), South Africa and Iraq. The finding shows that the study aspect of Online Learning spans the continent and not just Malaysia that conducts
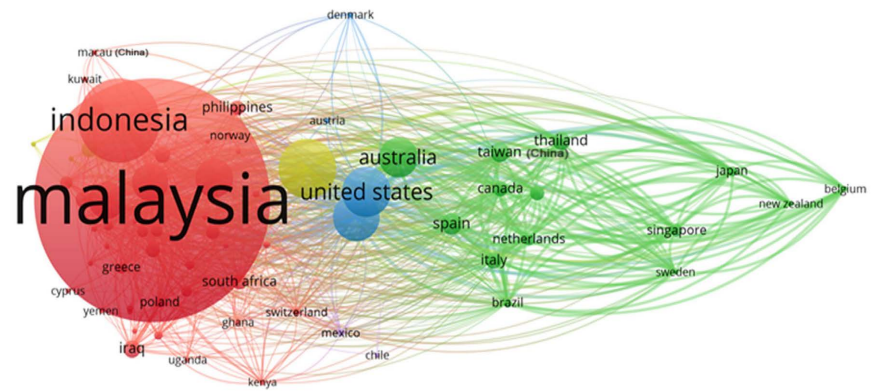
Figure 6. Country/region participation network.

the study. This may happen because of COVID, and there is a need to know certain aspects, reasons and solutions that need to be known with scientific data in solving learning problems even though COVID is ongoing.

5. Discussion

Since the end of the COVID-19 pandemic two years ago, online teaching and Learning have become standard practice. This analysis, which included the years 2020-2022 and 4229 studies, provided a snapshot of the current condition of pandemic online Learning. This study examines the most cited articles, countries or regions ranked by the number of publications, the trend of publications, countries, and highly cited journals to help researchers and practitioners better understand the current trends and impacts of online Learning sparked by the pandemic. In addition, this study is a little more about analyzing the themes and problems discussed among previous researchers related to Online Learning in Malaysia during the COVID-19 pandemic. Scholars and educators invested in management education's development and progress must have an accurate and up-to-date image of the state of online Learning during the pandemic, and this paper does just that.

Based on our findings, it appears that the number of papers published on topics connected to online education increased dramatically and dramatically during COVID-19. There was an increase beginning in 2020 (with 372 studies) and continuing through 2022 (with 4275 studies). These findings demonstrate that scholars are actively investigating the state of Online Learning and the causes, consequences, and potential remedies for its current deployment during COVID-19. It's important to remember that conventional Learning will be phased out in favour of online implementation during COVID-19. Thus naturally, this will cause several challenges and concerns to crop up. In addition, we analyzed the top Malaysian universities that had conducted research on e-learning during COVID-19. With 349 studies, the National University of Malaysia well outpaced other institutions. Malaysian universities do their utmost to investigate potential obstacles to introducing online education.

Despite COVID-19's widespread use in 2020-2022, the vast majority of re-

search activity occurred in the field of Social Sciences (23%), followed by other disciplines (16.8%), then computer science studies (15.6%), and finally in other connected subjects (see Figure 3). In addition, we also present the most cited author (see Table 3) and the top publisher who published studies related to Online Learning in Malaysia during Covid-19 (see Table 4). In addition, we analyzed the most frequently discussed keywords and topics in the context of online education in Malaysia. After analyzing the network map visualization tool, we discovered 7 significant clusters with 721 items (see Figure 4). The spread of diseases, e-learning, learning systems, social media, computer-assisted instruction, sustainability, technology, etc., are heavily weighted in the ranking. Finally, we found significant connections and ties between researchers in Malaysia and those in other countries (see Figure 5). We also elaborated on the connections between research conducted in Malaysia and the rest of the world (see Figure 6).

6. Conclusion

Bibliometric analysis has been more popular as a tool for tracking the evolution of intellectual output in recent years. This study compiles the theoretical contributions of 4229 papers discussing the issue of online education during the epidemic. This section originally investigated the prior settings of the research after presenting the bibliometric and key topic profiles. This brief study expands our understanding by zeroing in on the COVID-19 challenges specific to Malaysia's online education system.

In the same way that other bibliometric studies have shed light on online education, predicted the trajectory of future research, and uncovered opportunities for collaboration, so too did this one. The study's biggest flaw is that it was limited to research already available in the Scopus database. Several potentially pivotal pieces of research that may have improved the quality of online education may not exist because they were not included in Scopus's database. The analyses were performed with the help of keywords selected by the authors. You may have better luck if you use other phrases that have been refined in a broader setting. Researchers doing bibliometric studies on this topic can improve their analysis by pooling the data they acquire from numerous databases. Within the scope of vehicular themes, researchers interested in Online Learning can also conduct studies focusing on topics like "e-learning," "Open distance learning," and "web-based learning," as appropriate to their interests.

Although bibliometrics can help identify a complete understanding of a situation through statistical tools, it is unreliable because the subject's breadth, depth, and coverage are not always considered. Consider the following scenario in point. It is not sensible to differentiate the papers based on citations because concepts in low-cited papers in top journals may have good quality. In addition, the articles selected for discussion under each theme could not bring up relevant resources that don't explicitly contain the search criteria. As a result, papers may pass references to the phrases without adequately exploring how the terms are

used, perhaps introducing bias.

Co-Author Contribution

Author 1 carried out the fieldwork, prepared the literature review and overlooked the whole article's write up. Authors 2, 3 wrote the research methodology and did the data entry. Authors 4, 5, 6 carried out the statistical analysis and interpretation of the results.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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