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🔓 **Review Article**

Online Module: Bibliometric Analysis (1998–2023)

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Abstract

This study aims to analyze trends in the development of research or scientific publications, especially in topic development, keywords that frequently appear, articles that are most cited, institutions, and authors who are active and collaborate in developing online modules or web modules. The method used is bibliometric analysis with a database taken from Scopus from 1998 to 2023 in September 2023. From this search, 1434 articles were found related to online modules. Scopus data shows that the use and publication of online modules or web modules increased in 2021 and then decreased in 2023. *BMC Medical Education, Mededportal The Journal of Teaching and Learning Resources,* and *Currents in Pharmacy Teaching and Learning* are the top 3 journals that publish online modules or web modules. The institutions that publish the most online modules come from the US and Australia, including the University of Toronto, the University of Pittsburg, and the University of California, San Francisco. The most productive writers are Palermo with 341 articles, Jennifer N Stinson with 339 articles, and Nader Francis with 154 articles. The country with the highest number of articles, namely 597 articles, is the US. Publications regarding this online module are mostly in the fields of medicine, social sciences, nursing, computer science, medicine, and pharmacy. Likewise, institutions, journals, and authors who publish online modules or web modules are mostly in the fields of medicine and pharmacy. In the field of education and natural science itself, especially in the field of chemistry, it is still very rare to find. This can be used as a reference for current and future research trends.

Keywords: Blended learning, secondary school, trend and patterns

1. INTRODUCTION

After the COVID-19 pandemic, the term mobile learning has become increasingly popular in the learning process, even though the term mobile learning has been around for several years, as in the journal created by Sharples et al in 2014 (Sharples & Pea, 2014). Mobile learning is defined as a resource that can be accessed wherever we are, is not limited by time and space, and has strong search capabilities, and extensive interaction, which strongly supports effective learning and performance-based assessment (Quinn, 2020). Thus, the learning process is not only carried out in the classroom at the same time but the learning process can be carried out anywhere with the support of the internet signal itself. The learning process carried out face-to-face and online is known as blended learning (Mintii, 2023)

The term mobile learning refers to the use of mobile technology devices, such as cell phones, laptops, and tablets which are used in the learning process which can occur anywhere and at any time both inside and outside the classroom. The use of mobile learning is increasing over time because more and more students have cell phones (Irwanto et al., 2023)

1.1 Literature Review

Online learning modules are considered very effective in improving the quality of learning because it turns out they can be used as a substitute for classroom learning, helping remediate subject prerequisite material, introducing content with advanced laboratory practice, and also being used for final exam reviews (Nugent et al., 2016). Online modules can also improve student learning outcomes because it turns out students are interested in the possibility of having more access to quick self-assessments. In the chemistry learning process, especially biochemistry, online modules can also reduce students' stress levels and improve students' academic performance and learning quality (Tallmadge & Chitester, 2010)

Bibliometric analysis is used to analyze trends in research, be it individual research or research within a field of study, bibliometric analysis also provides evidence for the impact of individual research or fields of study, discovers new and currently developing research fields, identifies potential collaborators on new research, as well as identifying research sources suitable for publication and ongoing research. Bibliometric analysis techniques have two categories, namely performance analysis which takes into account the contribution of research constituents, and science mapping analysis which focuses on the relationship between research constituents (Donthu et al., 2021).

According to Donthu et al. (2021), the steps for carrying out bibliometric analysis begin with determining the objectives related to scientific review in the field of research, and the scope of the bibliometric study must have a broad scope with a very large amount of data, the second step is to determine techniques for bibliometric analysis, the third step is collecting data from databases such as Scopus and Web of Science, the final step is making analysis and reporting the findings. Of course, the analysis made must be relevant, and include bibliometric visualization in the form of images and tables as well as words that appear connected in the context of each cluster. This bibliometric visualization is carried out using bibliometric software such as Gephi, Leximancer, and VOSviewer.

VOSviewer is software used to build and visualize bibliometric networks such as journals, titles, authors, authors, publications and so on which was developed by Nees Jan van Eck and Ludo Waltman at Leiden University's Center for Science and Technology Studies (CWTS). This VOSviewer records the relationship between quotations, and the relationship between articles together through article data that we can get from Google Scholar, DOAJ, Dimensions, Science Direct, or journals that we have previously accessed. The steps in using VOSviewer for bibliometric analysis are preparing a dataset using keywords, importing a dataset from journal or article data in RIS format, the visualization process by creating the map we need, saving the network, and importing the file until we get the desired visualization image (https://www.vosviewer.com/).

1.2 Purpose of the Study

To support the learning process using mobile learning, it needs to be supported by learning modules as a guide in achieving the desired learning competencies. This module contains learning objects in the form of stand-alone content and tasks that

correspond to learning outcomes in the form of video, animations, graphics, text, and quizzes. With this module, students can determine their learning access by freely moving pages, watching, or evaluating interesting content (Nugent et al., 2006). However, it turns out that there are not too many references regarding online modules, therefore there is a need for the study of research in the field of online modules to develop online modules, especially in the field of formal education. Bibliometric analysis is needed to see research trends regarding this online module concerning the following questions :

RQ1. What are the current publication and citation trends?
RQ2. Which references are most cited, which institutions are the most productive, and which universities and countries are most active in research?
RQ3. Who are the most active authors?
RQ4. What is the co-authorship status for authors and countries and author keyword distributions?

2. METHODS
2.1 Design

This research aims to find out studies about online modules using bibliometric analysis mapping by analyzing trends and publications, citations, authors, journals, institutions, countries, and keywords. Bibliometric analysis is a quantitative method that describes the characteristics of literature such as journal articles or conference proceedings. This bibliometric analysis is used to answer various research questions, such as identifying trends in research fields, measuring the impact of publications, and comparing the productivity of different research groups
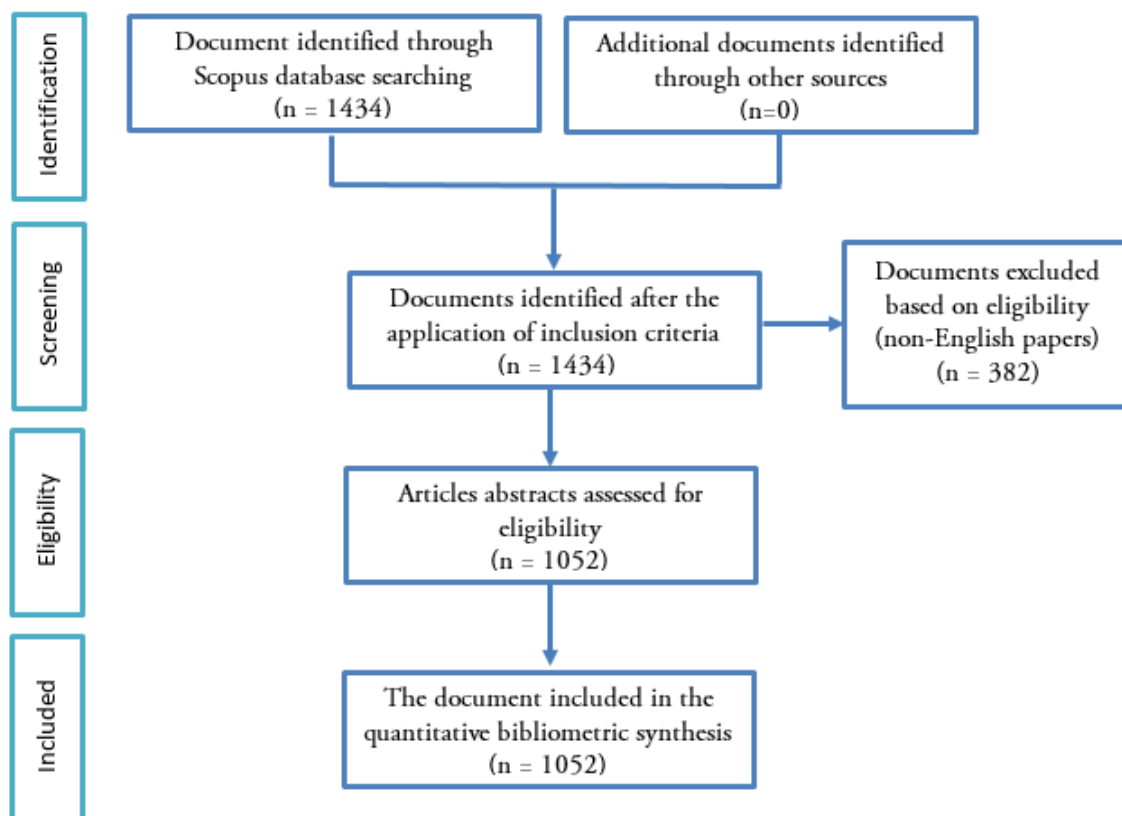
Figure 1. The Research Protocol

The data search process refers to the Preferred Reporting Items for Systematic Review and Meta-Analysis framework (Moher et al., 2009), or PRISMA for short. PRISMA is a tool and guide used to assess a systematic review or meta-analysis of research whose aim is to strengthen research data. The PRISMA method consists of 5 stages that must be carried out, namely 1) defining eligibility criteria 2) determining sources of information 3) data selection 4) data collection, and 5) data retrieval as presented in the following Figure 1.

2.2 Data Collection and Analysis

Data collection was carried out in September 2023 using Scopus because Scopus is the largest indexer in the world which can contain more journals from various related scientific disciplines and can explain more topics that may not be available in other scientific databases by using online modules or web keywords module, learning module. From the Scopus database, data was obtained for 1,434 documents containing online learning modules/webs After documents were excluded based on eligibility (non-English articles), 1052 documents were deemed appropriate.

Data obtained from Scopus is exported in the form of CSV and RIS (Research Information Synthesis) files. This research data was processed using Microsoft Excel and obtained percentages and frequencies. In addition, this data was also exported using VOSviewer to obtain a collaborative network of variables and keywords.

The data analyzed using Excel is data in the form of a single calculation, namely the distribution of articles and citations from 1998 to 2023 which are presented in graphical form, and the data presented in tabular form is publication data and average citations per year, namely the majority of the data. writer. active, data from journals that actively publish articles related to online modules/web modules, data from universities that actively conduct research relevant to online modules, as well as data from countries with the largest number of articles relevant to online modules.

3. RESULTS

From data searches via Scopus using the keywords "web module" or "online module" without using year restrictions, 1434 documents were obtained that contained online modules, and after documents were excluded based on eligibility (not in English), 1052 articles were obtained. From the results of searching Scopus data, it can be seen that the term online module began to appear in 1998. The following are the findings obtained from this research.

3.1 Online Module on Publication Trends and Citations From 1998 – 2023

The trend of publications with the keywords "online module" or "web module" from 1998 to 2023 can be seen in Figure 2.

Figure 2 shows that from 1998 to 2023 when this review was carried out on September 21 2023, the number of articles regarding "online modules" or "web modules" has increased. In 1998 the number of articles containing online modules was 3 articles and in 2021 the number increased to 131 articles, but then decreased again in 2023, the number of articles became 108 articles.

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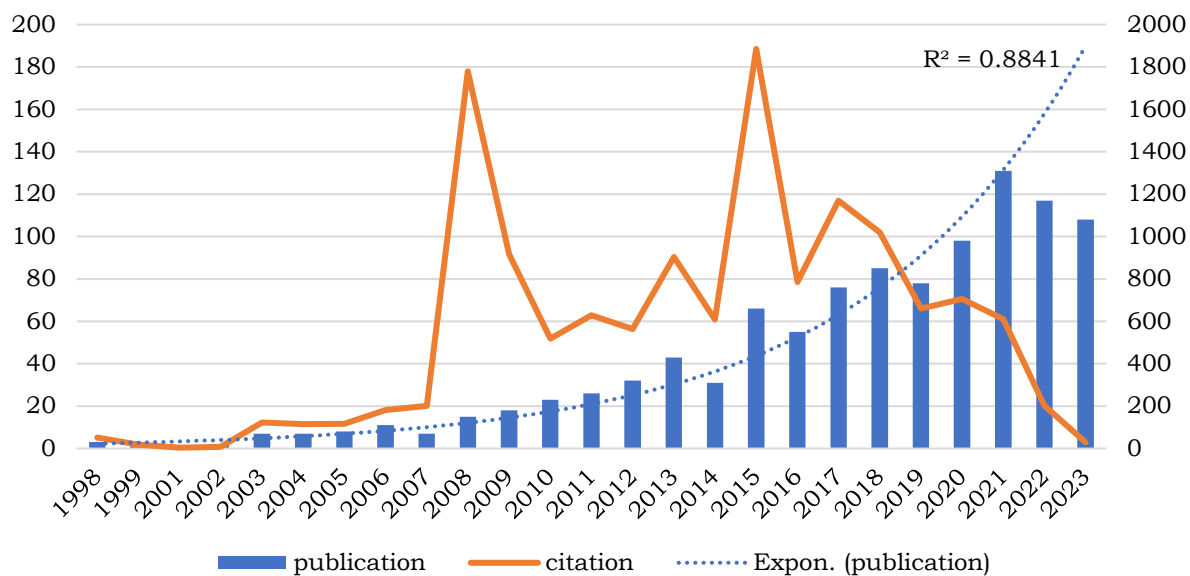
Figure 2. Publication and Citation Trends from 1998–2023

3.2 10 Most Cited Publications

10 Most Cited Publications of the 1052 articles that have eligibility, they have been cited 13,806 times with the most citations occurring in 2008 with 1779 citations and in 2015 with 1885 citations. The most cited research in the field of online modules is presented in Table 1.

Table 1. Top 10 Most Cited Publications

Author	Title	Year	Source	Cites
Clauset et al., (2008)	Hierarchical structure and prediction of missing links in networks	2008	Natural	1591
Paunesku et al., (2015)	Mindset Intervention Is a Measurable Treatment for Low Academic Achievement	2015	Psychology	499
Palermo et al., (2009)	Randomized controlled trial of an Internet-delivered family cognitive behavioral therapy intervention for children and adolescents with chronic pain	2009	Painful	278
Kortsch et al., (2015)	Climate change is altering the structure of Arctic marine food webs due to the poleward shift of boreal generalists	2015	Proceedings of the Royal Society B: Biological Sciences	259
van der Vaart et al. (2014)	Integrating online therapy into regular face-to-face therapy for depression: Content, ratio, and prerequisites according to patients and therapists using a Delphi study	2014	BMC Psychiatry	162
(Stinson et al., 2010)	An Internet-based self-management program with telephone support for adolescents with arthritis: A randomized controlled trial	2010	Journal of Rheumatology	149
(Chi et al., 2018)	Translating ICAP Cognitive Engagement Theory into Practice	2018	Cognitive Science	143

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Author	Title	Year	Source	Cites
Weikl & Bögenberger, (2013)	Relocation strategies and algorithms for free-floating car-sharing systems	2013	IEEE Intelligent Transportation Systems Magazine	139
Khribi et al. (2009)	Automatic recommendations for e-learning personalization based on web usage mining and information retrieval techniques	2009	Educational Technology and Society	117
Francis et al. (2017)	Consensus on a structured training curriculum for transanal total mesorectal excision (TaTME)	2017	Surgical Endoscopy	110

From Table 1, it can be seen that the article entitled Hierarchical Structure and Prediction of Missing Links in Networks written by Clauset et. al is the most visited, namely 1591 articles with an average citation of 106.07. The second most cited article is the article entitled Mind-Set Interventions Are a Scalable Treatment for Academic Underachievement written by Paunesku et al with a total of 499 article visits and an average of 62.38 citations per year. And the third most cited article is the article written by Palermo et. al with the title Randomized controlled trial of a family cognitive-behavioral therapy intervention delivered via the Internet for children and adolescents with chronic pain with an average number of citations of 278 or around 19.86.

3.3 Top 10 Authors

The 10 major authors who are most active in publishing online modules are presented in Table 2. From this table, it can be seen that Palermo T, M is ranked first as the most productive with a total of 341 articles, and second-ranked with a total of 339 articles is Stinsonm Jennifer N who comes from Canada. Francis, Nader ranked third in 154 articles.

Table 2. Top 10 Authors

Author	Institution	Country	N	H-Index
Palermo TM	Children's Hospital and Regional Health Center	US	341	65
Stinson, Jennifer N.	University of Toronto	Canada	339	55
Francis, Nader	St Mark's Hospital	Inggris	154	38
Clause A	University of Colorado Boulder	US	98	40
Chi, Michelene TH	Mary Lou Fulton Teachers College, Phoenix	US	96	44
van der Vaart, Rosalie	Rijksinstituut voor Volksgezondheid en Milieu.	Nederland	37	15
Khribi, Mohamed Koutheair	Mada Center, Doha	Qatar	20	8
My Paunes, David	Stanford University	US	19	14
Kortsch, Susanne	Helsingin yliopisto	Finland	19	11
Okay, Simone	Technische Universität München, Munich	Germany	9	6

3.4 Top 10 Active Journals

Based on the Scopus data obtained, the journals most actively publishing articles about online modules or web modules are BMC Medical Education,

Mededportal The Journal of Teaching and Learning Resources, and Currents in Pharmacy Teaching and Learning. Of all the existing journals, the majority are journals in the medical field, this means that online modules in the medical and pharmaceutical fields are often used. Of course, this attracts attention as to why the world of education itself has not published too many journals regarding online modules, in Table 3 there is only the Chemistry Education Journal which publishes online modules. This can be taken into consideration when writing articles about online modules.

Table 3. Top 10 Active Journals

Journal	N	Publisher	H-Index	Q	SJR
BMC Medical Education	20	BioMed Central Ltd.	87	Q1	0.91
Mededportal Journal of Teaching and Learning Resources	14	Association of American Medical Colleges	14	Q3	0.50
Currents in Pharmacy Teaching and Learning	14	Elsevier Inc.	27	Q1	0.45
Journal of Chemical Education	12	American Chemical Society	95	Q2	0.56
American Journal of Pharmacy Education	12	AACP	74	Q1	0.80
Medical Science Educator	11	New York Spring	26	Q2	0.39
One Please	10	Science Public Library	404	Q1	0.89
Test	9	BioMed Central Ltd.	91	Q2	0.81
Medical Teacher	8	Health Information	131	Q1	1.22
Journal of Surgical Education	8	Elsevier Inc.	66	Q1	0.94

3.5 Top 10 Institutions

Based on the data in Table 4, the institutions that conduct research in the field of online modules are public institutions and come from institutions in large countries, namely Australia and the US.

Table 4. Top 10 Institutions

Institution	Country	Type	Document
University of Toronto	Australia	Public	28
University of Pittsburgh	US	Public	19
University of California	US	Public	18
Monash University	US	Public	17
University of North Carolina at Chapel Hill	US	Public	17
Harvard Medical School	US	Private	16
University of Queensland	Australia	Public	16
University of Washington	US	Public	15
University of Sydney	Australia	Public	15
University of Melbourne	Australia	Public	14

The University of Toronto is the top research institution with 28 documents, then in second place is the University of Pittsburgh from America with 19 documents, and in third place is the University of California, San Francisco in America with 18 documents.

3.6 Top 10 countries

Countries that are actively conducting research in the field of online modules are as shown in Table 5 based on the Scopus database.

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Table 5. Top 10 Institutions

Country	N	%
United States	597	56.75
Canada	103	9.79
Australia	101	9.60
Great Britain	60	5.70
Germany	30	2.85
Netherlands	24	2.28
Malaysia	20	1.90
China	19	1.81
Sweden	12	1.14

The most active country and at the top of the ranking is America with a total of 597 articles or around 56.75% of the authors there discussing online modules. Then in second place is Canada with 103 articles or around 9.79% and in third place is Australia with 101 articles or around 9.60%. England, Germany, the Netherlands, Malaysia, China, and Sweden have also conducted research in the field of online modules, but not as much as America, Canada, and Australia, but have made a large contribution to the development of online modules.

3.7 Co-authorship for Authors

This research also analyzes collaboration between authors regarding online modules or web modules shown in Figure 3. Data was taken from Scopus and analyzed using VOSviewer with the minimum number of authors per document being 25 with the minimum number of documents for an author being 1 and the minimum number of citations for an author being 1. There were 1061 authors found and 871 met the threshold. From this figure, it can be seen that only a few authors correlate.
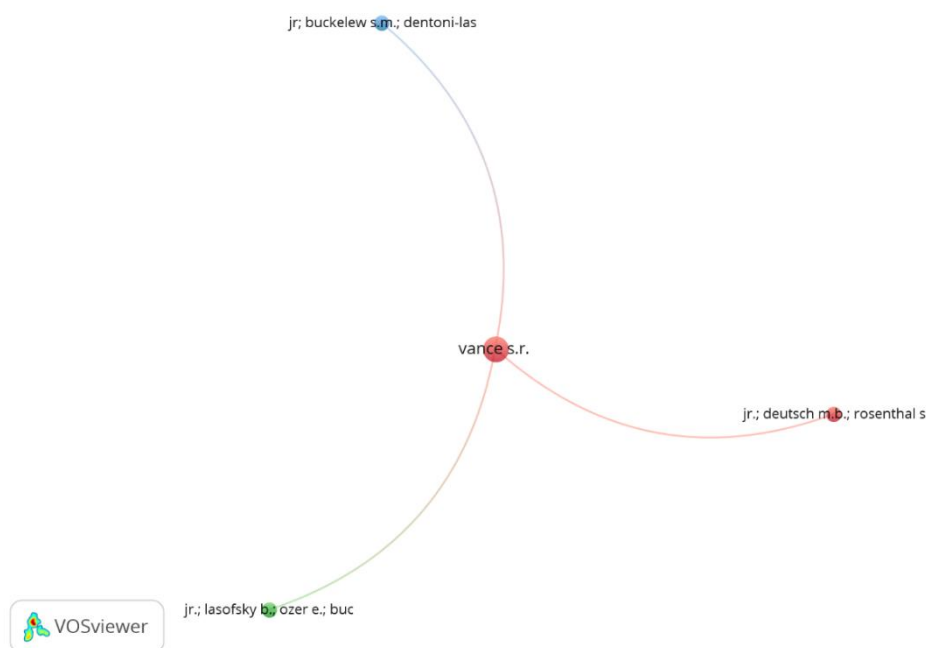

Figure 3. Co-Authorship for Authors

In Figure 3, it can be seen that the co-author for the author consists of 3 clusters with 3 links. Cluster 1 in red has 2 items consisting of jr; Deutsch mb;

Rosenthal s and vance sr Cluster 2 with 1 green item consisting of jr; lasofsky b; ozer e and Buckelew sm and Cluster 3 in blue consisting of jr; Buckelew am; Denton-weld. The author who wrote the most was the one with the biggest nudes, namely Vance SR. And the trend for these three clusters started from 2017 to 2020.

3.8 Co-Authors for Countries

Analysis of author relationships between countries is also visualized in Figure 4, where these countries also write about online modules or web modules. This data was also taken from Scopus and analyzed using VOSviewer with a minimum number of authors per document of 25 with a minimum number of documents for country 2 and a minimum number of citations for country 1, found 113 authors and 60 met the threshold.
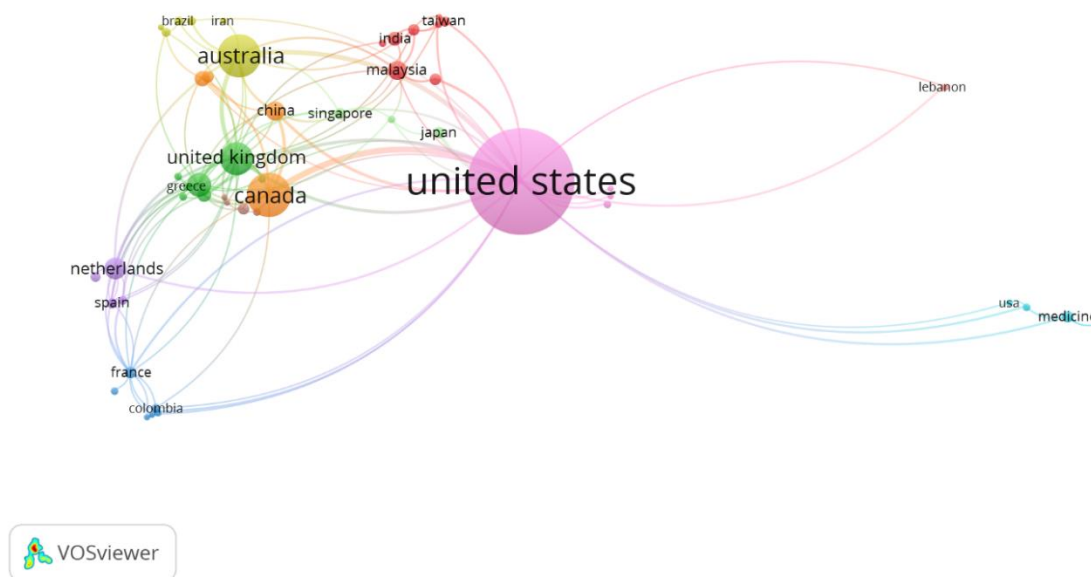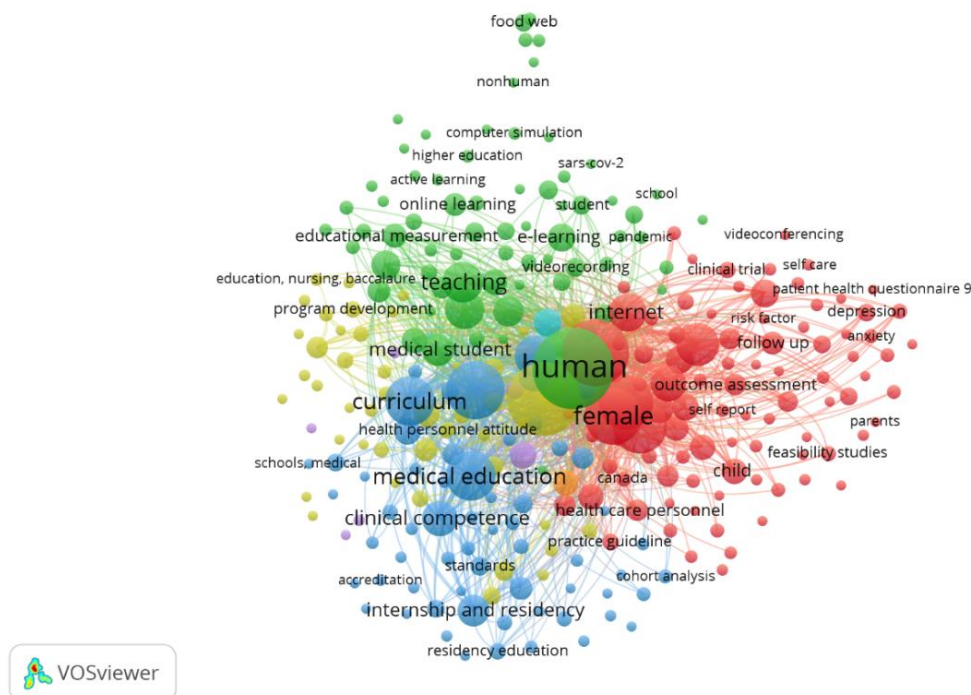

Figure 4. Co-authors for Countries

From Figure 4, we can see that the bibliometric analysis of co-authors consists of 55 items, 11 clusters, 146 links, and 236 link strengths. The countries that write a lot about online modules are large countries such as the United States, Canada, Australia, England, and Germany, although some of them also appear in developing countries such as Malaysia, China, Singapore, India, and Taiwan. In Co-Authors for Countries, the United States is the country that writes the most about online modules. These countries collaborated from 2014 to 2022.

3.9 Co-Occurrence For Keywords

Co-Occurrence For Keywords analyzed with VOSviewer produces an image as seen in Figure 5.

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Figure 5. Co-occurrence of Keywords

Data was taken with the minimum co-occurrence of a keyword being 10, of 5975 keywords 277 met the threshold. For each of the 277 keywords, the total link strength of co-occurrences with other keywords will be calculated. The keyword with the greatest total link strength will be selected. In the co-occurrence of all keywords, 7 clusters were obtained, and 18518 links were interconnected. The keywords that appear most frequently are in the fields of humans, teaching-learning, education, medical education, women, and the internet from 2015 to 2020.

3.10 Co-occurrence for Author Keywords

Bibliometric analysis for co-occurrence of author keywords was also visualized using VOSviewer with results as shown in Figure 6

Data was taken with a minimum co-occurrence of author keywords of 10, of 2748 keywords 32 met the threshold. For each of the author's 32 keywords, the total link strength of co-occurrence with other keywords will be calculated. The keyword with the greatest total link strength will be selected. Bibliometric analysis for co-occurrence with author keywords obtained 32 items of data, 4 clusters consisting of cluster 1 of 10 items, namely curriculum, depression, education, internet, mental health, online, online module, randomized controlled, training, undergraduate medical shown by red. The second cluster with 8 items with the keywords continuing education, evaluation, non-professional education, online education, primary care, quality improvement, resident education, and simulation is shown in green. The third cluster with 7 items consists of active learning, blended learning, communication, curriculum development, medical education, online modules, and telehealth which are shown in blue. And the fourth cluster with 7 items shown in yellow consists of assessment, Covid-19, e-learning, higher education, information literacy, learning, and online learning. This author's collaboration network started from 2017 to 2020.
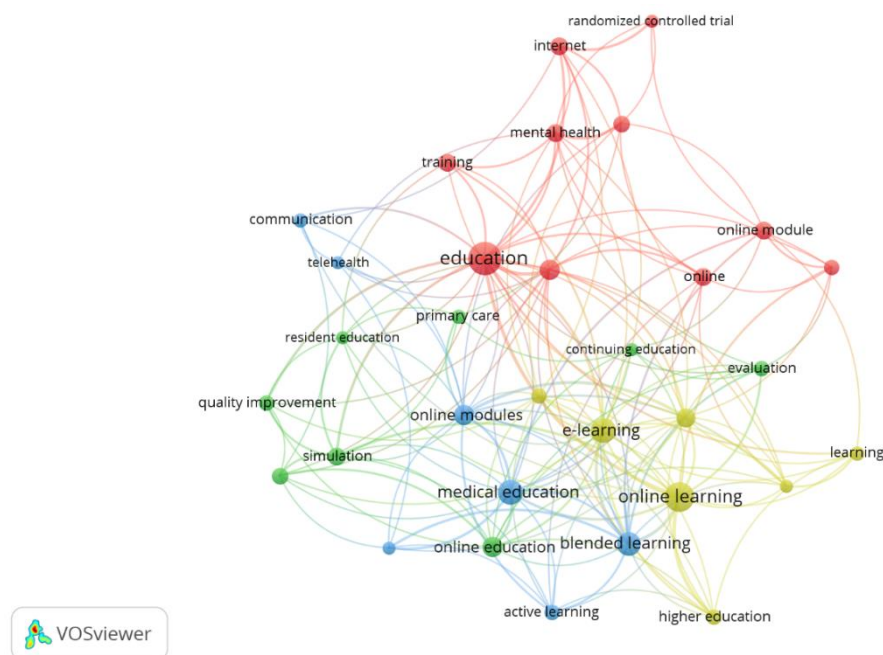
Figure 6. Simultaneous Occurrence of Author Keywords

4. DISCUSSION AND CONCLUSION

In this study, research trends regarding online modules are discussed without being limited by year. However, it turns out that articles about online modules began to appear from 1998 to 2023 based on a database collected from Scopus on September 21, 2023. Scopus data shows that 1,434 documents were found and 1,052 of them were in the form of articles/journals from the graph obtained (Figure 1) it can be seen that the number of articles regarding online modules from 1998 to 2023 has increased significantly with a value of R = 0.926. In 1998, 3 articles appeared about online modules, then their development continued to increase from year to year.

The highest number of articles about online modules was in 2021, namely 131 articles, where in that year the blended learning process began to become widely known after the Covid-19 pandemic because it was thought to be able to increase student response and activeness in the learning process. With online modules in post-COVID-19 blended learning, it is considered a Negotiation Space (Biberman-Shalev et al., 2023). For medical students, virtual learning through online modules is an effective way to understand service quality content and according to them the virtual learning experience can deliver the material effectively (Donohue et al., 2021), as stated in the article (Abdelkarim, 2021), students are very interested in the learning videos in their learning kits.

From the graph, it can also be seen that citations are increasing from year to year and this means that researchers are starting to be interested in researching online modules. The data on the most cited publications that we obtained from Scopus, was processed into table form with a limit of the top 10 most cited publications. The most cited articles turned out to be articles related to medicine, this shows that online modules have indeed been used in medical education and other medical training. It can be seen in Table 1 that the article entitled "Hierarchical structure and prediction of missing links in networks" (Clauset et al., 2008) has an average of 106.07 citations per year. The second article was written by Paunesku et

al. (Paunesku et al., 2015) with an average of 62.38 citations per year. The reason why online modules are more widely used in the medical field is that many higher education experts agree that online learning will continue and develop long after COVID-19, and of course, the medical field needs visual technology that can support their learning process (MacNeill et al., 2023), in addition, medical students and faculty believe that online educational resources and technology can improve teaching and learning in medical education (Kasat & Muthiyan, 2020). Interestingly, in the education sector, there are still very few articles that contain online modules, such as the article entitled "Automatic recommendations for personalizing e-learning based on web usage and information retrieval mining techniques" written by Khribi et al. in 2009 (Khribi et al., 2009) cited 117 times or 7.80 articles per year. Of course, this is a big question, especially for educational practitioners.

From the ranking based on the most active journals by looking at Schimago data, data is obtained as in Table 3, namely that almost all journals have an SJR (Scimago Journal Rank) value above 0.15. This means that the SJR scores of all journals are good and indexed by Scopus (MacNeill et al., 2023). In Table 3 it is also clear that active journals are on average in the highest cluster, namely Q1 (ASAN & ASLAN, 2020). Once again we are faced with data that journals that actively discuss online modules are journals in the medical or pharmaceutical fields. BMC Medical Education is at the highest SJR, namely around 0.91 with the cluster being in Q1. The educational journal that discusses online modules is in fourth place, namely the Journal of Chemistry Education which is in the Q2 cluster and with an SJR of 0.56. This can certainly encourage researchers and practitioners in the education sector to always play an active role in conducting online module research.

From the Scopus database, we also get the active role of institutions or institutions that play an active role in conducting research in the field of online modules. There are 10 leading institutions or institutions presented in Table 4, and on average they are public institutions, where the first place is the University of Toronto from Australia which is a public institution with a total of 28 documents, the second highest is the University of Toronto. Pittsburgh comes from America with a total of 19 documents and the institutions that appear most active mostly come from America. And if we look at the countries that are most active in writing about online modules are America, Canada, and Australia as seen in Table 5, where America has achieved 56.75% of its activity in writing about online modules in the last few years. The United States is the preeminent leader in online education in the world today, with hundreds of online colleges and thousands of online courses available to students, the number of students enrolled in online courses exceeds the number of students in higher education as a whole (Allen et al., 2011). Distance education is also becoming an increasingly popular option for Australians who want to return to school without delaying their careers, this growth was further driven by the economic crisis in 2008 and 2009, resulting in Swinburne University of Technology (SUT) and Open Universities Australia (OUA) collaborating to provide open online education (Palvia et al., 2018), of course, this provides a positive direction in the development of online modules as one of the current research trends.

In research that uses bibliometric analysis with the keywords online module or web module, data is obtained that in co-authorship for authors there is an interrelated relationship between one author and another author. It is important for academics and evaluators interested in tracking co-authorship as a proxy for collaboration to collect additional data beyond the data available from popular bibliometric sources because such information means more precise modeling and better management and policy decision-making (Ponomariov & Boardman, 2016).

Based on the VOSviewer image obtained (Figure 3), the authors are grouped into 3 clusters with different colors, namely the red cluster, blue cluster, and green cluster. The red cluster consisting of writers Deutsch, Madeline B. and Rosenthal, Stephen M is related to Vance, Stanley R., but it turns out that Vance is also related to the blue cluster with writers Buckelew, Sara M and Dentoni-Lasofsky, Brian and is also related to Ozer, Elizabeth of the green cluster. This means that each author has a connection with the other in writing about online modules or web modules.

Likewise, if we look at the online module or web module keyword data based on the co-occurrence of author keywords and the co-occurrence of a keyword that appears most frequently is the field of humanity, medicine, pharmacy, medical education, and then education, which means that the online module or web modules are currently widely used in the fields of medicine, nursing, and pharmacy (MacNeill et al., 2023). However, this analysis was carried out only on databases obtained from Scopus, the data could be different if bibliometric analysis was carried out for data from Web of Science and there are also many articles not in English that discuss this online module. Further research for online modules or web modules can be carried out, especially in the fields of education and science.

Research regarding online modules has experienced significant development, but it turns out that this research is still limited to the fields of medicine and pharmacy, there has not been much research in the fields of education or science. Therefore, online modules can be developed in more depth in the fields of education and science to support the current blended learning process.

Conflict of Interest

Funding

REFERENCES

Abdelkarim, A. (2021). Creating predoctoral orthodontic laboratory online modules and a complete course kit in response to COVID-19. *Journal of Dental Education*, *85*(S1), 921–922. https://doi.org/10.1002/jdd.12359

Allen, I. E., Seaman, J., & Survey, B. (2011). Going the Distance: Online Education in the United States, 2011. *Modern Healthcare*, *January 2011*. https://doi.org/10.1049/el.2012.2018

ASAN, A., & ASLAN, A. (2020). Quartile Scores of Scientific Journals: Meaning, Importance and Usage. *Acta Medica Alanya*, *4*(1), 102–108. https://doi.org/10.30565/medalanya.653661

Biberman-Shalev, L., Broza, O., & Chamo, N. (2023). Contextual Changes and Shifts in Pedagogical Paradigms: Post-COVID-19 Blended Learning as a Negotiation Space in Teacher Education. *Education Sciences*, *13*(3). https://doi.org/10.3390/educsci13030275

Chi, M. T. H., Adams, J., Bogusch, E. B., Bruchok, C., Kang, S., Lancaster, M., Levy, R., Li, N., McEldoon, K. L., Stump, G. S., Wylie, R., Xu, D., & Yaghmourian, D. L. (2018). Translating the ICAP Theory of Cognitive Engagement Into Practice. *Cognitive Science*, *42*(6), 1777–1832. https://doi.org/10.1111/cogs.12626

Clauset, A., Moore, C., & Newman, M. E. J. (2008). Hierarchical structure and the prediction of missing links in networks. *Nature*, *453*(7191), 98–101.

https://doi.org/10.1038/nature06830

Donohue, K. E., Farber, D. L., Goel, N., Parrino, C. R., Retener, N. F., Rizvi, S., & Dittmar, P. C. (2021). Quality Improvement Amid a Global Pandemic: A Virtual Curriculum for Medical Students in the Time of COVID-19. *MedEdPORTAL : The Journal of Teaching and Learning Resources*, *17*, 11090. https://doi.org/10.15766/mep_2374-8265.11090

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*(April), 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Francis, N., Penna, M., Mackenzie, H., Carter, F., Hompes, R., Aigner, F., Albert, M., Araujo, S., Arezzo, A., Arnold, S., Atallah, S., Austin, R., Biebl, M., Bonjer, J., Boni, L., Bordeianou, L., Brunner, W., Cahill, R., Davies, R., … Zorron, R. (2017). Consensus on structured training curriculum for transanal total mesorectal excision (TaTME). *Surgical Endoscopy*, *31*(7), 2711–2719. https://doi.org/10.1007/s00464-017-5562-5

Irwanto, I., Saputro, A. D., Widiyanti, W., & Laksana, S. D. (2023). Global Trends on Mobile Learning in Higher Education: A Bibliometric Analysis (2002–2022). *International Journal of Information and Education Technology*, *13*(2), 373–383. https://doi.org/10.18178/ijiet.2023.13.2.1816

Kasat, P. A., & Muthiyan, G. G. (2020). The Study of Usage of Online Learning Resources in Medical Courses. *International Journal of Research in Electronics & Computer Engineering*, *6*(1 March 2018), 1–6.

Khribi, M. K., Jemni, M., & Nasraoui, O. (2009). Automatic recommendations for e-learning personalization based on web usage mining techniques and information retrieval. *Educational Technology and Society*, *12*(4), 30–42.

Kortsch, S., Primicerio, R., Fossheim, M., Dolgov, A. V., & Aschan, M. (2015). Climate change alters the structure of arctic marine food webs due to poleward shifts of boreal generalists. *Proceedings of the Royal Society B: Biological Sciences*, *282*(1814). https://doi.org/10.1098/rspb.2015.1546

MacNeill, H., Masters, K., Nemethy, K., & Correia, R. (2023). Online learning in health professions education. Part 1: Teaching and learning in online environments: AMEE Guide No. 161. *Medical Teacher*, *0*(0), 1–14. https://doi.org/10.1080/0142159X.2023.2197135

Mintii, I. S. (2023). Blended learning: definition, concept, and relevance. *Educational Dimension*, *8*, 85–111. https://doi.org/10.31812/ed.539

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ (Online)*, *339*(7716), 332–336. https://doi.org/10.1136/bmj.b2535

Nugent, G., Kohmetscher, A., M. Namuth-Covert, D., Guretzky Guretzky, J., Murphy, P., & Lee, D. (2016). Learning from Online Modules in Diverse Instructional Contexts. *Interdisciplinary Journal of E-Skills and Lifelong Learning*, *12*(January), 113–121. https://doi.org/10.28945/3511

Nugent, G., Soh, L.-K., & Samal, A. (2006). Design, Development, and Validation of Learning Objects. *Journal of Educational Technology Systems*, *34*(3), 271–281. https://doi.org/10.2190/9bf6-1kbl-y3cx-6qxg

Palermo, T. M., Wilson, A. C., Peters, M., Lewandowski, A., & Somhegyi, H. (2009). Randomized controlled trial of an Internet-delivered family cognitive-behavioral therapy intervention for children and adolescents with chronic pain. *Pain*, *146*(1–2), 205–213. https://doi.org/10.1016/j.pain.2009.07.034

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S.

Scientia
Publica
Media

(2018). Online Education: Worldwide Status, Challenges, Trends, and Implications. *Journal of Global Information Technology Management, 21*(4), 233–241. https://doi.org/10.1080/1097198X.2018.1542262

Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-Set Interventions Are a Scalable Treatment for Academic Underachievement. *Psychological Science, 26*(6), 784–793. https://doi.org/10.1177/0956797615571017

Ponomariov, B., & Boardman, C. (2016). What is co-authorship? *Scientometrics, 109*(3), 1939–1963. https://doi.org/10.1007/s11192-016-2127-7

Quinn, C. (2020). *mLearning : July 2001*.

Sharples, M., & Pea, R. (2014). Mobile learning. *The Cambridge Handbook of the Learning Sciences, Second Edition, January 2014*, 501–521. https://doi.org/10.1017/CBO9781139519526.030

Stinson, J. N., McGrath, P. J., Hodnett, E. D., Feldman, B. M., Duffy, C. M., Huber, A. M., Tucker, L. B., Hetherington, C. R., Tse, S. M. L., Spiegel, L. R., Campillo, S., Gill, N. K., & White, M. E. (2010). An internet-based self-management program with telephone support for adolescents with arthritis: A pilot randomized controlled trial. *Journal of Rheumatology, 37*(9), 1944–1952. https://doi.org/10.3899/jrheum.091327

Tallmadge, T., & Chitester, B. J. (2010). Integrating Concepts using Online Tutorials in a Freshman Chemistry Course. *Transformative Dialogues: Teaching & Learning Journal, 4*(2), 1–7. http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=56553924&site=ehost-live

van der Vaart, R., Witting, M., Riper, H., Kooistra, L., Bohlmeijer, E. T., & van Gemert-Pijnen, L. J. E. W. C. (2014). Blending online therapy into regular face-to-face therapy for depression: Content, ratio and preconditions according to patients and therapists using a Delphi study. *BMC Psychiatry, 14*(1), 1–10. https://doi.org/10.1186/s12888-014-0355-z

Weikl, S., & Bogenberger, K. (2013). Relocation strategies and algorithms for free-floating car sharing systems. *IEEE Intelligent Transportation Systems Magazine, 5*(4), 100–111. https://doi.org/10.1109/MITS.2013.2267810