

Understanding Online Learning Readiness among University Students: A Bibliometric Analysis

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Abstract—Many learners and educators have challenges accepting online education due to the non-traditional educational style. Additionally, many learners are not familiar with utilizing online learning platforms for educational purposes due to their lack of readiness. Therefore, this research comprehensively examines online learning readiness by conducting a bibliometric analysis. This study expanded all research from 2010 to 2020 by utilizing the similarities visualization software (Vosviewer). A sum of 1371 publications were analyzed as documented in the Scopus database in July 2021, identifying the most compelling subjects covered by the journal. Findings demonstrate several significant research concerns (E-learning readiness, ICT education, Technology Acceptance Model TAM). Several emerging topics have been identified (Digital learning, online learning environments, self-directed learning). The research presents a roadmap for potential researchers, concentrating on critical areas where success is possible.

Keywords—online learning readiness, online learning adoption, bibliometric analysis

1 Introduction

Learners' readiness toward online learning is considered one of the requirements to enhance their academic achievements [1]. However, unlike traditional classes, online learning does not ensure learners' attendance. Therefore, it is hard to ascertain how students are concentrated during online learning settings [2][3][4][5][6]. Learners' readiness toward online learning is essential in influencing learners' willingness of involvement in class as well as the online learning quality. Consequently, investigate the crucial aspects that contribute to the online learning student's revival. Learners' readiness for online settings has been studied for decades [7].

Consequently, this research quantitatively analyzes online learning readiness publications published between (2010–2020) to examine the research landscape comprehensively, particularly online learning readiness using Bibliometrics analysis. Bibliometrics analysis is a statistical method for quantifying and assessing the number of rising trends in a specific study area [8][9]. Bibliometrics analysis has been employed to assess academic outputs of numerous study disciplines (e.g., [10][11][12]). In addition, they have been intended to evaluate educational study disciplines. For instance, based upon 3914 Publications that were gathered from the Web of Science (WoS), [13][14]

systematically analyzed the intellectual structure, trends, and status of online learning settings dialogue study by spotting the top journals as well as contributors, as well as illustrating the scientific associations. Chen et al. [15][16] similarly examined research papers in Computers and Education from a quantitative perspective regarding scientific collaborations, author profiles, and research topics.

For this purpose, the objectives of this study are to analyze online learning publications indexed in Scopus by using bibliometrics and visualization analysis. Moreover, in the current study, all data have been collected from Scopus, the world's leading abstract and citation database of peer-reviewed research. Therefore, this research data included many leading journals in online learning and education technology resources. This analysis allowed us to see how the research interests of online learning have been altered over time. Additionally, this research visualized and investigated the scientific collaborations among top contributors in online education that were unavailable in prior studies. Exclusively, we intended to answer the following research questions:

1. What is the distribution of online learning readiness publications by years for the last decade?
2. What are the most relevant Journals and authors in online learning readiness research?
3. What are the most productive countries in the online learning readiness research area?
4. What are the primary research keywords for the last decade of online learning readiness?

2 Materials and methods

This review aims to reveal the profile of the studies conducted for online learning readiness for the last decade. To achieve this aim, bibliometric and visualization methods were used together in the study. Moreover, Bibliometric analysis is based on following the studies on a specific subject and revealing the findings by analyzing these studies according to various characteristics [17]. Relevant publications in the Scopus database were included in the study to reach high-quality articles, excluding any conferences or proceedings. In the scan conducted on 17/07/2021, keywords were searched in the title, summary, or keyword sections by selecting the “Topic” option. English and open access articles were included in the study among the articles obtained after the search. “Online learning readiness” and “E-learning readiness” have been used as keywords and phrases that evoke them. Scopus has been used to obtain online learning readiness journals in this research since it includes intelligent tools to visualize, analyze, and track study output in different areas such as humanities, technology, and science [18] [19]. Additionally, to guarantee the relative significance of the analyzed publications to online learning readiness, we have carried out manual screening to exclude irrelevant publications following the criteria shown in Table 1. In this manner, 1371 publications remained for additional analysis. Exclusion and inclusion criteria are presented in Table 1. In addition, the analytic research framework is illustrated in Figure 1.

3 The bibliometric analysis

The bibliometric analysis method was also used in the study. With bibliometric analysis, the most used keywords, the most cited journals, the most published journals, the journals that published the most studies on the subject, the countries that did the most studies on the subject, the publication cooperation between countries, the keywords used and the relationship between them, the most cited authors, the relationship between the authors, the journals that were jointly cited and the most published areas were examined. The VOSViewer software, one of the widely used programs in visualizing bibliometric networks, was used to reveal the network visualization in the analysis. This review is being carried out based on the following purposes. First, online learning has evolved into a compelling research area with growing research numbers. Thus, it is required to investigate the thematic structure of such a study area by utilizing an accurate machine learning method that could spontaneously examine sizeable, documented literature data. Then, the current research is being carried out to help provide insights concerning what has been discussed and the trends in online learning.

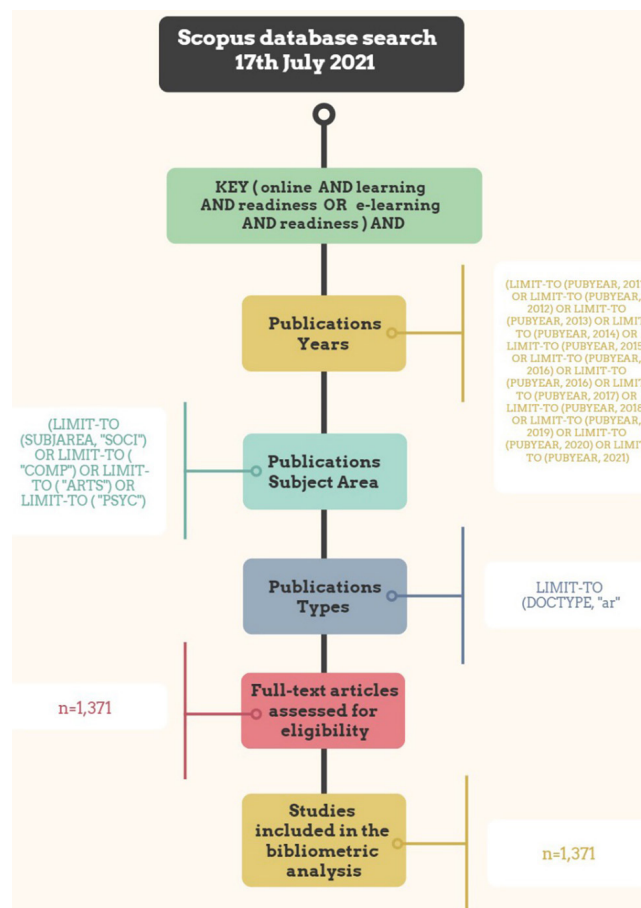


Fig. 1. Analytic framework of the study

Table 1. The inclusion and the exclusion criteria for data screening

Inclusion criteria	Online learning readiness, online learning platforms, online learning environments.
	Technology adoption, ICT adoption
	Students' readiness, student's satisfaction, student's autonomy, students' achievements
Exclusion criteria	Online learning in (medical and engineering fields)
	Conference papers, proceedings papers, nonindexed publications.

4 Findings

The study aims to reveal the studies' profile for online learning readiness for the last decade. The findings of this review were discussed based on the research questions.

4.1 Research question 1

What is the distribution of online learning readiness publications by years for the last decade? To address the first finding, an analysis was conducted of the publication year of the articles through the previous decade. It was seen that the papers were mainly published in the last couple of years; in the year 2020, a total number of 330 publications were published concerning online learning readiness; in the year 2021, a total number of 297 publications were published regarding online learning readiness, following by a total number of 209 publications in the year of 2019. The other publications were distributed for the rest of the years, as shown in Figure 2. For example, the total number of online learning readiness journals for the year 2020 was expected as 330.

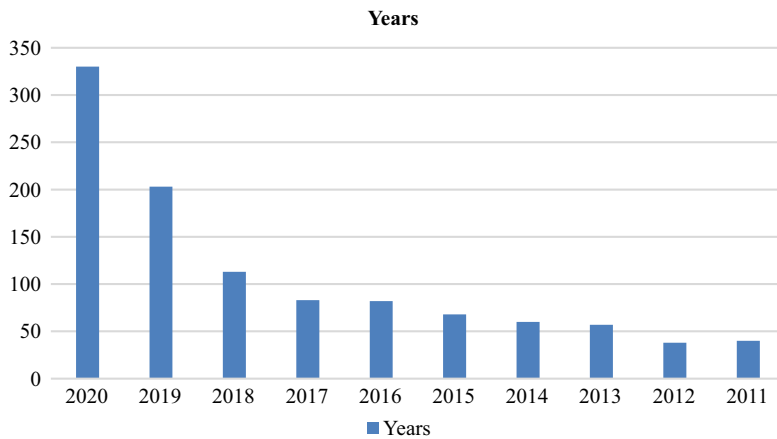


Fig. 2. Distribution of publications by years (2011–2020)

4.2 Research question 2

What are the most relevant Journals and authors in online learning readiness research? In the content analysis made for the most cited journals, “Total Publication,” “Total Citation,” “Cite Score of the journal,” “The most cited article,” “Times cited,” and “Publisher” was chosen as the analysis criteria as presented in Table 2.

Table 2. The top 10 highly productive journals on online learning readiness in the years (2011–2021)

Journal	TP	TC	Cite Score (2020)	The Most Cited Article (Reference)	Times Cited	Publisher
Education and Information Technologies	3478	720	5.4	Exploring the critical challenges and factors influencing the E-learning system usage during the COVID-19 pandemic	65	Springer Nature
International Review of Research in Open and Distance Learning	1035	234	5.8	Designing a community of inquiry in online courses	10	Athabasca University
Turkish Online Journal of Distance Education	208	380	2.2	Investigating Student Satisfaction in Online Learning: The Role of Student Interaction and Engagement in Distance Learning University	5	Anadolu University
British Journal of Educational Technology	462	3247	7.6	Gamification of in-class activities in flipped classroom lectures	6	Wiley-Blackwell
Educational Technology Research and Development	402	1549	5.0	Shifting digital, shifting context: (re)considering teacher professional development for online and blended learning in the COVID-19 era	5	Springer Nature
Australasian Journal of Educational Technology	195	882	5.5	University students’ digital competence in three areas of the DigCom 2.1 model: A comparative study at three European universities	14	Australasian Society for Computers in Learning in Tertiary Education (ASCILITE)
Distance Education	114	509	4.7	Online learning performance and satisfaction: do perceptions and readiness matter?	26	Taylor & Francis

(Continued)

Table 2. The top 10 highly productive journals on online learning readiness in the years (2011–2021) (Continued)

Journal	TP	TC	Cite Score (2020)	The Most Cited Article (Reference)	Times Cited	Publisher
Journal of Computing in Higher Education	99	477	6.7	Blockchain-based approach to creating a model of trust in open and ubiquitous higher education	39	Springer Nature
Education Sciences	1166	2662	2.1	E-learning critical success factors during the covid-19 pandemic: A comprehensive analysis of e-learning managerial perspectives	32	Multidisciplinary Digital Publishing Institute (MDPI)
International Journal of Instruction	788	2262	207	EECN: Analysis, potency, a benefit for student’s knowledge and attitude to conserve mangroves and coral reefs	12	Gate Association for Teaching and Education

Note: TP = Total Publications, TC = Total Citation.

Table 2 shows that the most productive journal concerning online learning readiness was “Education and Information Technologies” with a total publications number 3478, and a total citation of 720, followed by “International Review of Research in Open and Distance Learning” with a total publications number 1035, and a total citation of 234, in addition to “Turkish Online Journal of Distance Education” with a total publications number 208, and a total citation of 380. Moreover, the distribution of the most productive journals concerning online learning readiness is presented accordingly in Table 2.

On the other hand, RQ2 also investigated the most prolific authors in the online learning readiness research area. In the content analysis made for the prolific authors in the online learning readiness research area, “Author,” “Total Publications,” “h-index,” “Total citations,” “current affiliation,” and “country” were chosen as the analysis criteria as shown in Table 3.

Table 3. List of the 15 most prolific authors in the online learning readiness research area

	Author	Year of 1st Publication	TP	h-Index	TC	Current Affiliation	Country
1	Horzum, Mehmet Bar	2008	37	14	556	Sakarya Üniversitesi, Sakarya, Turkey	Turkey
2	Almaiah, Mohammed Amin	2014	40	13	500	King Faisal University, Saudi Arabia	Saudi Arabia
3	Downing, Jillian J.	2012	17	6	138	University of Tasmania, Tasmania	Australia
4	E. Dymont, Janet	2002	55	19	1096	Acadia University, Wolfville, Canada	Canada
5	Stone, Cathy	2008	28	10	338	The Faculty of Business and Law, Perth, Australia	Australia

(Continued)

Table 3. List of the 15 most prolific authors in the online learning readiness research area (*Continued*)

	Author	Year of 1st Publication	TP	h-Index	TC	Current Affiliation	Country
6	Bonk, Curtis Jay	1990	94	24	2250	Indiana University Bloomington, Bloomington, United States	United States
7	Downing, Jillian J.	2012	17	6	138	University of Tasmania, Tasmania	Australia
8	E. Dymont, Janet	2002	55	19	1096	Acadia University, Wolfville, Canada	Canada
9	Liang, Jyhchong	1999	148	29	3284	National Taiwan Normal University, Taipei, Taiwan	Taiwan
10	Sharma, Bibhya Nand	2003	82	14	484	University of the South Pacific, Suva, Fiji	Fiji
11	Thang, Siewming	1997	49	11	328	HELP University, Kuala Lumpur, Malaysia	Malaysia
12	Tsai, Chin Chung	1998	419	67	16660	National Taiwan Normal University, Taipei, Taiwan	Taiwan
13	Yunus, M. M.	2007	186	16	1209	Universiti Kebangsaan Malaysia, Bangi, Malaysia	Malaysia
14	Adams, Donnie	2014	26	9	167	Universiti Malaya, Kuala Lumpur, Malaysia	Malaysia
15	Ankrah, Ebenezer	2016	6	13	2	University of Ghana, Accra, Ghana	Ghana

Note: TP = Total Publications, TC = Total Citation.

Table 3 shows 15 prolific authors in the online learning readiness research area. Moreover, the most prolific author was “Tsai, Chin Chung” with a total number of publications of 419, with the most h-index of 67, in addition to a total of 16660 citations, and the author is from Taiwan. Followed by “Liang, Jyhchong” with a total number of publications of 148, with an h-index of 29, in addition to a total of 3248 citations, and the author is from Taiwan as well. Followed by “Yunus, M. M.” with a total number of publications of 186, with an h-index of 16, in addition to a total of 1209 citations, and the author is from Malaysia. Furthermore, from an H-index standpoint, the top three remained the same as ranked by the publishing count. Moreover, other prolific authors in online learning readiness research area data were presented in Table 3.

4.3 Research question 2

What are the most productive countries in the online learning readiness research area? In the content analysis made for the most productive countries in the online learning readiness research area, “country,” “Total Publications,” “and “most productive academic institution” were chosen as the analysis criteria as shown in Table 4 and Figure 3.

Table 4. List of the 15 most productive countries in the online learning readiness research area

Rank	Country	TP	Most Productive Academic Institution	Rank	Country	TP	Most Productive Academic Institution
1	USA	311	University of Virginia	9	Spain	44	IESE Business School
2	Turkey	152	Inönü University	10	Saudi Arabia	41	King Faisal University
3	Malaysia	109	Universiti Teknologi MARA UiTM	11	Iran	38	Islamic Azad University
4	Australia	93	University of Western Australia	12	Canada	37	University of Toronto
5	Indonesia	75	Sebelas Maret University	13	Russian federation	37	National Research University
6	United Kingdom	64	University College London, University of Exeter, University of Sussex	14	Hong Kong	32	The Education University of Hong Kong
7	South Africa	58	Cape Peninsula University of Technology	15	South Korea	32	KyungHee Cyber University
8	China	48	Hebei Finance University				

Note: TP = Total Publications.

Table 4 and Figure 3 show the most 15 productive countries in the online learning readiness research area illustrate the topic distributions of the top prolific countries/ regions and establishments. From a country standpoint, most of the listed countries/ regions demonstrated a stable interest in all the research matters relating to online learning. In contrast, various countries/ regions showed a specific interest in specific trends. For example, the most productive country was the “united states,” with a total number of publications of 311 within the University of Virginia. They were followed by “Turkey” with a total number of publications of 152, within the Inonu University, and followed by “Malaysia” with a total number of publications of 109, within the University Technology MARA UiTM. Moreover, other prolific, productive countries in online learning readiness research area data were presented in Table 4.

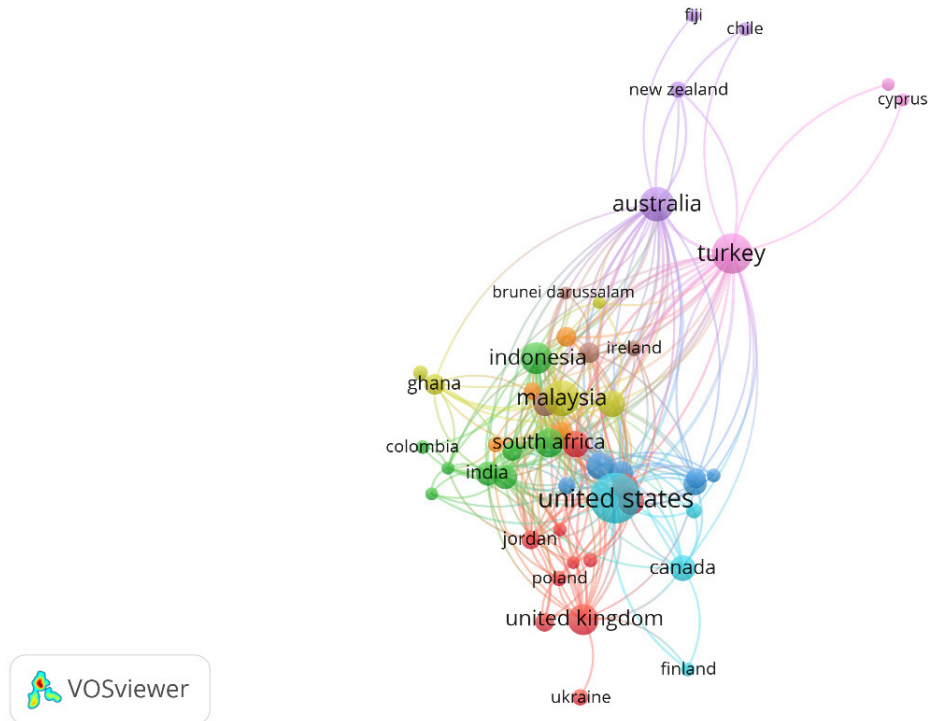


Fig. 3. Analysis results of productive countries in online learning readiness research

Figure 3 illustrates the analytical results of productive countries in online learning readiness research. Thus, in contrast to countries/regions, institutes listed in the figure presented more interest in specific matters, the most productive country was “united states,” followed by “Turkey,” followed by “Malaysia” Moreover, Australia, Indonesia, United Kingdom, South Africa, China, Spain, Saudi Arabia, Iran, Canada, Russian Federation, Hong Kong, South Korea were listed as top 15 countries in the research field. Beginning With the analysis, it was evident that the countries/ regions from within the same institutions and continents from within the same countries/ regions with comparable study interests tend to collaborate more in the online learning research areas.

4.4 Research question 4

What are the primary research Keywords concerning online learning readiness for the last decade? For the bibliometric analysis of the most used keywords, “Co-occurrence” was selected as the analysis type, and “Authors keywords” was marked as the unit. In this context, 400 keywords have been identified from the data set, as shown in Figure 4.

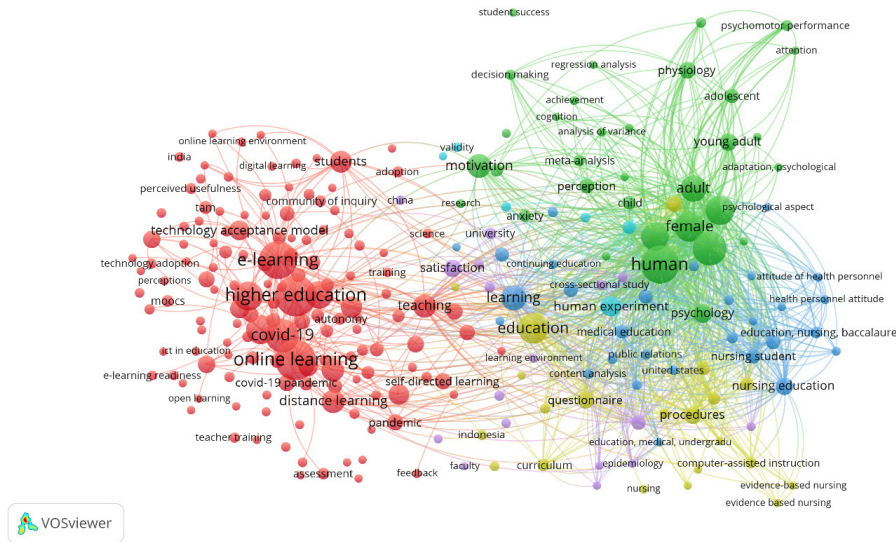


Fig. 4. Analysis results of publications by keywords

When Figure 4 is examined, the keywords used in the studies listed as “online learning readiness” (Occurrences “Oc” = 74), “online education” (Oc = 46), “e-learning” (Oc = 29), “online learning” (Oc = 25), “distance learning” (Oc = 24) and “ICT” (Oc = 18). These were followed by e-learning, education, ICT adoption, technology adoption, and technology education. When the keywords of the publications are examined, it is seen that approximately 61% (n = 135) use words such as online learning and technology adoption. In addition, those keywords such as satisfaction, achievements, ICT, and education technology research are less preferred in bibliometric analysis.

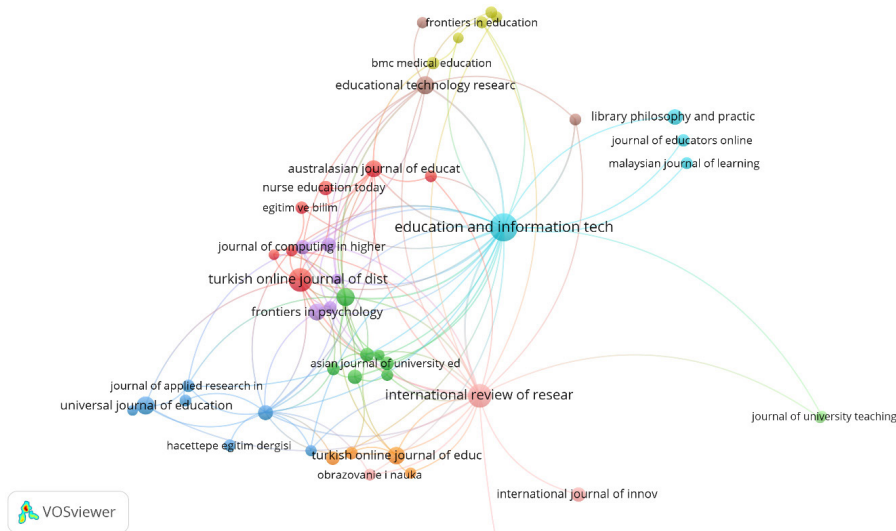


Fig. 5. Most cited journals (citation)

When Figure 5 is examined, the first four journals with the most citations are listed, firstly, Education And Information Technologies (article title: Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic, citation = 65), secondly, International Review of Research in Open and Distance Learning (article title: Designing a community of inquiry in online courses, citation = 10), thirdly, Turkish Online Journal of Distance Education (article title: Investigating Student Satisfaction in Online Learning: The Role of Student Interaction and Engagement in Distance Learning University, citation = 5). Finally, British Journal of Educational Technology (article title: Gamification of in-class activities in flipped classroom lectures, citation = 6). The results of the Most cited journals (Co-Citation) analysis are presented in Figure 5 (Items = 86, Cluster = 7, Links = 1214 and TLS = 8667).

5 Discussions

According to the 1734 research publications gathered from the Scopus database, this research review presents an overview of online learning readiness review utilizing content analysis and bibliometrics. This trend analysis of research review reveals an increasing interest in online learning readiness research as a promising field of study. Such an analysis of the publishing sources indicates that online learning readiness is mainly welcomed by interdisciplinary fields concentrating on the relationship of technologies and their implications in education in general. (See Figure 6).

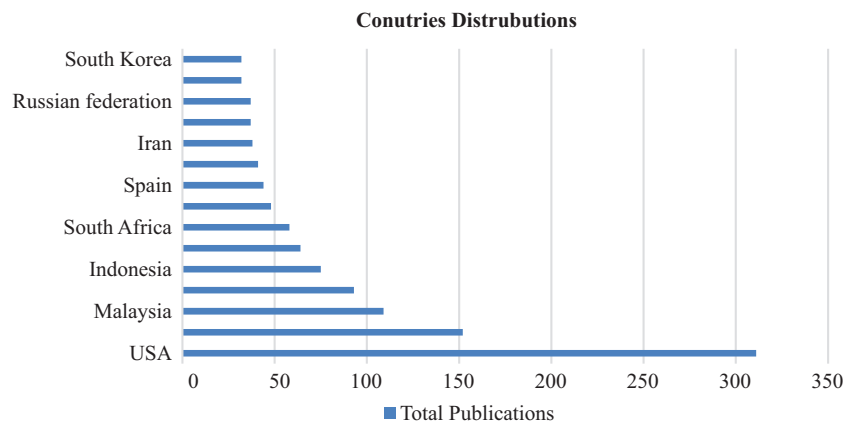


Fig. 6. Country distribution and total publications

The USA has contributed to roughly 30% of the analyzed literature, with Virginia University being the most productive educational institute. Moreover, Scientific cooperation analysis shows that countries/regions (e.g., the USA, Turkey, Malaysia, and Australia) presenting more interest in global cooperation are likely to evolve faster. Additionally, the collaborations among the same institutions or regions are much more significant. This study has identified the most related research topic in online learning and readiness. These topics include (online learning environments, ICT adoption, the utilization of technology in educational settings. Furthermore, the current study also

illustrates that the most tendencies and trends in online learning readiness research area, that could be divided into six major themes, (1) Readiness in Online learning, (2) Self-efficacy towards Computer and Internet use, (3) Learners' self-control, (4) Communication and Self-efficacy in online settings, (5) Self-directed Learning, (6) Learning Motivation.

6 Conclusion and implications

The world is now changing the way of higher education from the traditional way to intelligent learning. To detect the research topics and their dynamics in the online learning readiness research area, this paper conducts analyses in 1732 online learning readiness publications using bibliometrics and content analysis. The distribution of the annual number of online learning readiness publications reflects this research field's dramatically increasing interest. Such active research on online learning readiness indicates a promising future development trend. Interdisciplinary journals focusing on the connection between education and technology are involved in online learning readiness research. Virginia University was the most productive country and institution publishing online learning readiness research. International collaborations can contribute to better scientific performance. Phrases such as "online learning readiness," "technology adoption," "ICT adoption," "online learning environments," and "E-learning platforms" are commonly used and mentioned in online learning readiness publications. Predominant research topics include technology integration, Blended learning, and educational technology research. Most subjects, including online education, Blended learning, students' achievements, satisfaction, autonomy, and technology in education, have received significantly increasing attention from scholars devoted to the online learning research.

7 Limitation

There are limitations to this research. Initially, the Scopus database only has been used for data collection. Thus, it does not cover all academic journals. Consequently, journals from another database, for example, the WoS, may not have been included in this analysis. Moreover, the most recent publications for 2021 in Scopus were disregarded. Nonetheless, such limitations are not likely to impact the trends and patterns identified in this research. Additionally, only "online* learning*" and "E-Learning* readiness*" as search terms have been used in retrieving data. Though using precise search terms can result in a narrower data set. All future technologies which can be used for accomplishing online learning were considered, including "online* learning*," "blinded* classroom*," "learning analytics," "educational technology*," "education settings," and "online education." Consequently, using more precise search terms were used in this analysis (i.e., "online* learning*" and "E-learning* readiness*"), concentrating on the realization of online learning readiness instead of the prospective methods that could be involved.

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