

REFLECTIONS ON MASSIVE OPEN ONLINE COURSES (MOOCS) DURING THE COVID-19 PANDEMIC: A BIBLIOMETRIC MAPPING ANALYSIS

Dr. Ahmed TLILI

ORCID: 0000-0003-1449-7751
Smart Learning Institute, Beijing Normal University
Beijing, CHINA

Dr. Fahriye ALTINAY

ORCID: 0000-0002-3861-6447
Faculty of Education, Near East University
Nicosia, TURKISH REPUBLIC OF NORTHERN CYPRUS

Dr. Zehra ALTINAY

ORCID: 0000-0002-6786-6787
Faculty of Education, Near East University
Nicosia, TURKISH REPUBLIC OF NORTHERN CYPRUS

Dr. Cengiz Hakan AYDIN

ORCID: 0000-0002-9186-1791
Open Education Faculty, Anadolu University
Eskisehir, TURKIYE

Dr. Ronghuai HUANG

ORCID: 0000-0003-4651-5248
Smart Learning Institute, Beijing Normal University
Beijing, CHINA

Dr. Ramesh C. SHARMA

ORCID: 0000-0002-1371-1157
School of Global Affairs, Dr. B. R. Ambedkar University Delhi
New Delhi, INDIA

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ABSTRACT

Massive Open Online Courses (MOOCs) have been around for some time, but several studies highlighted different issues associated with them, including quality. The COVID-19 pandemic catalyzed their second blooming, where MOOCs have seen a surge in enrollments since March 2020. This study intended to explore how this enrollment reflected on the research studies included in scientific publications, indexed by Web of Science. Specifically, the bibliometric mapping analyses of 108 studies have revealed an ongoing trend in the countries contributing to the MOOCs research, namely USA, China, UK and Spain. Additionally, MOOCs research coming from US, UK and other western countries was decreasing before the pandemic and showed a continuous dramatic reduction also during the COVID-19 pandemic. Growing attention in MOOCs research among less represented countries was also observed. Besides, most of the topics focused on by MOOCs research during the pandemic were mainly related to education and engineering.

Keywords: Bibliometric mapping analysis, Covid-19 pandemic, Massive Open Online Courses (MOOCs), research, learning resources.

INTRODUCTION

The COVID-19 pandemic has posed great challenges to the field of education. As of October 2020, more than 1.6 billion children and youth in 188 countries, accounting for 94 percent of world's student population, have been affected by the pandemic (UNESCO, 2020; UNICEF, 2020). In a time of health crisis, in order to contain the spread of virus, countries have implemented policies, such as travel restrictions, closing of borders, and closing of schools (Bergdahl & Nouri, 2020). The unexpected health crisis pushed educators to come up with new learning methods in response to this pandemic. The major change is the transition to remote learning, giving rise to distance education. Hodges et al. (2020) defined remote teaching as “a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances. It involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses and that will return to that format once the crisis or emergency has abated.”

One of the remote learning solutions used by universities during this pandemic to maintain education from home is Massive Open Online Courses (MOOCs). Unlike traditional online courses, MOOCs can provide rich learning resources (video, audio, PPT, etc.) and accommodate hundreds of students online from different regions/locations (Stracke, Downes, Conole, Burgos, & Nascimbeni, 2019). Despite that MOOCs quality has been questioned by several researchers, MOOCs have seen the highest pick in terms of enrollment number, since 2007 (Razo, 2020). For instance, Coursera had over 10 million course enrolments over 30 days in 2020, a 644% increase compared to last year. In addition, edX reached the world's top 1000 websites during the COVID-19 pandemic (Shah, 2020). This shows that this pandemic brought MOOCs to the spotlight again, due to their features that can help in maintaining education during uncertain times, such as this pandemic, namely (Bozkurt, 2020; Huang et al., 2020a): (1) openness, where students can access to these courses and learn without any restrictions from home; (2) flexibility, where students can learn depending on their own pace and needs without being limited to a specific time schedule; (3) social interaction, where students can use forums to collaborate together on some learning activities, as well as to talk with each other. For instance, Peter the Great St. Petersburg Polytechnic University has provided a MOOC about Philosophy for 3122 students during the COVID-19 (Bylieva, Bekirogullari, Lobatyuk, & Nam, 2020). London School of Hygiene and Tropical Medicine is also providing a MOOC titled “COVID-19: Tackling the Novel Coronavirus.” It aims to raise health-care awareness among people (Shah, 2020). Huang et al. (2020a) further reported that several universities started releasing MOOCs to maintain education from home for their students.

Based on the background above, it is seen that despite the criticism that MOOCs received, the COVID-19 pandemic brought them again to the front line as one of the popular ways of maintaining education from home, making them from a “curse” to a “blessing”. Therefore, this study aims to conduct a bibliometric mapping analysis to draw reflections on MOOCs during this COVID-19 pandemic. Bibliometric mapping analysis was adopted mainly because it provides visual representations of the relations existing between the main concepts (Yilmaz, Topu, & Takkac Tulgar, 2019). This visualization through mapping enables researchers to identify the background of a given research field, the relations between key concepts, and the possible trends to develop in the future (Heersmink, van den Hoven, van Eck, & vanden Berg, 2011; Vogel & Masal, 2015). Since the early days, systematic review or bibliographic analyses of MOOCs research have been conducted. For instance, in one of the earlier ones, Liyanagunawardena, Adams, and Williams (2013) examined the research studies published between 2008–2012 and uncovered that the early studies were mostly conceptual, descriptive, theory-based and focused on characteristics of the learners. Later a series of similar studies followed on different aspects of MOOCs research, such as research methods and topics (Gašević, Kovanovi, Joksimovi, & Siemens, 2014; Raffaghelli, Cucchiara, & Persico, 2015), learner characteristics (Zhang, Yin, Luo, & Yan, 2017), self-regulated learning (Alonso-Mencia, et al., 2020; Reparaz, Aznarez-Sanado, & Mendoza, 2020), retention (Paton, Fluck, & Scanlan, 2018; Zhu, Sari, & Lee, 2020), countries contributed (Veletsianos & Shepherdson, 2016). Particularly, during the COVID-19 pandemic, several bibliometric mapping analysis studies have been conducted related to a specific focus, such as business and management (Verma, & Gustafsson, 2020), however, to the best of our knowledge, no research has focused on MOOCs during this pandemic.

The findings of this study can contribute to the future research about MOOCs and open education in uncertain times, such as crises and pandemics. These findings can also contribute to the recent initiative launched by The United Nations Educational, Scientific and Cultural Organization (UNESCO), calling for more research and debate on how knowledge and education should be designed in a complex and uncertain world (UNESCO, 2020). As indicated before, this study intended to explore how this enrollment reflected on the research studies included in scientific publications, indexed by Web of Science. Specifically, this study answers the following research questions:

- RQ1. Which countries are the most contributors to MOOCs research during the COVID-19 pandemic?
- RQ2. What is the distribution of MOOCs research during the COVID-19 pandemic in terms of document type, index and topic?
- RQ3. What are the frequently used terms in keywords, abstracts and titles of MOOCs research during the COVID-19 pandemic?

METHOD

This study conducted a bibliometric analysis, with both quantitative and statistical analysis to report the distribution patterns of research articles within specific topics and time periods (Marti-Parreno, Mendez-Ibanez, & Alonso-Arroyo, 2016). It is a systematic and reproducible review process of scientific publications, using quantitative measures to evaluate research articles and depict their trends and patterns in a given period (Aria & Cuccurullo, 2017; Broadus, 1987). This analysis allows researchers to understand the literature and facilitate knowledge building by creating multiple types of associations among patterns, keywords and references. This study followed the bibliometric analysis steps, suggested by Zancanaro et al. (2013), namely: (1) collecting, filtering, and data standardization; and, (2) analysis and synthesis of the collected data.

As a first step, the search process was conducted in the Web of Science (WoS) database, one of the largest databases of peer-reviewed literature. The search keywords were: MOOCs OR Massive Open Online Courses AND Covid-19 OR Coronavirus OR pandemic OR crises. The time was set to the year 2020 and above, as the COVID-19 pandemic started at the end of 2019. Studies that did not focus on MOOCs research during the COVID-19 pandemic or have talked about MOOCs in other crises or pandemics were excluded from the analysis. As a result, 108 studies were obtained. Since the obtained studies were from only one database (WoS), data standardization was not needed in this context. The final search was conducted on March 05, 2021.

As a second step, the obtained studies were then analyzed in various ways to answer our three research questions. For instance, some of the results given by the search function were exported to Excel file to quantify them. Additionally, VOSviewer software was used for the construction of distance-based co-occurrence maps, where terms retrieved from titles and abstracts were clustered and mapped according to their relatedness in a similarity matrix (Van Eck & Waltman, 2010).

FINDINGS

The reporting of the results was organized into three subsequent sections based on the research questions.

Countries Contributing to the MOOCs Research during the COVID-19 Pandemic

When examining the countries contributing to the MOOCs research, 44 countries were found. Particularly, Table 1 shows only those which have at least two studies. It can be seen that most of research studies related to MOOCs and COVID-19 were from China ($n = 24$) with a rate of 22.2%, followed by Spain with a rate of 16.6% ($n = 18$) and USA with a rate of 14.8% ($n = 16$). The rest of the countries are shown in detail in Table 1.

Findings should respond to the purpose of the study and be presented systematically. They should be supported with sufficient and relevant quotations, examples, tables and diagrams. Findings should be discussed with a reference to relevant and recent literature.

Table 1. Distribution of Academic Studies by Country

Countries	N	%
China	24	22.222
Spain	18	16.667
USA	16	14.815
India	6	5.556
Mexico	6	5.556
Belgium	5	4.63
Italy	5	4.63
Morocco	5	4.63
Russia	5	4.63
Turkiye	5	4.63
Ecuador	4	3.704
England	4	3.704
Australia	3	2.778
France	3	2.778
Greece	3	2.778
Jordan	3	2.778
Malaysia	3	2.778
Netherlands	3	2.778
Germany	2	1.852
Indonesia	2	1.852
Ireland	2	1.852
Scotland	2	1.852
Sweden	2	1.852
Yemen	2	1.852

Table 2 further presents that the most cited countries related to MOOCs studies during the COVID-19 pandemic. It is seen that Spain had the highest citation rate, followed by China, Ecuador, Australia, USA, Chile and France. It should be noted that countries with less than 10 citations were not included in Table 2.

Table 2. Top Cited Countries related to MOOCs Studies during the pandemic

country	documents	citations
Spain	18	34
China	24	26
Ecuador	4	18
Australia	3	16
USA	16	11
Chile	1	10
France	3	10

Particularly, Table 3 presents the most universities that contributed to the MOOCs research during the COVID-19 with at least three studies. It is found that most studies were conducted by Universidad Rey Juan Carlos from Spain (n = 5), followed by Tecnológico De Monterrey from Mexico and Wayne State University from USA, with 4 studies each.

Table 3. Distribution of MOOCs Research during the pandemic by University

Affiliations	N	%
Universidad Rey Juan Carlos	5	4.63
Tecnologico De Monterrey	4	3.704
Wayne State University	4	3.704
Hse University National Research University Higher School Of Economics	3	2.778
Indiana University Bloomington	3	2.778
Indiana University System	3	2.778
Symbiosis International University	3	2.778
Universidad De Especialidades Espiritu Santo	3	2.778

Distribution of MOOCs Research during the COVID-19 Pandemic in Terms of Document Type, Index and Topic

When examining the published studies by document type, Figure 1 shows that 83.3% (n = 90) of the studies consist of articles. 24.7% (n = 26) are early access studies, followed by review articles (5.55%, n = 6).

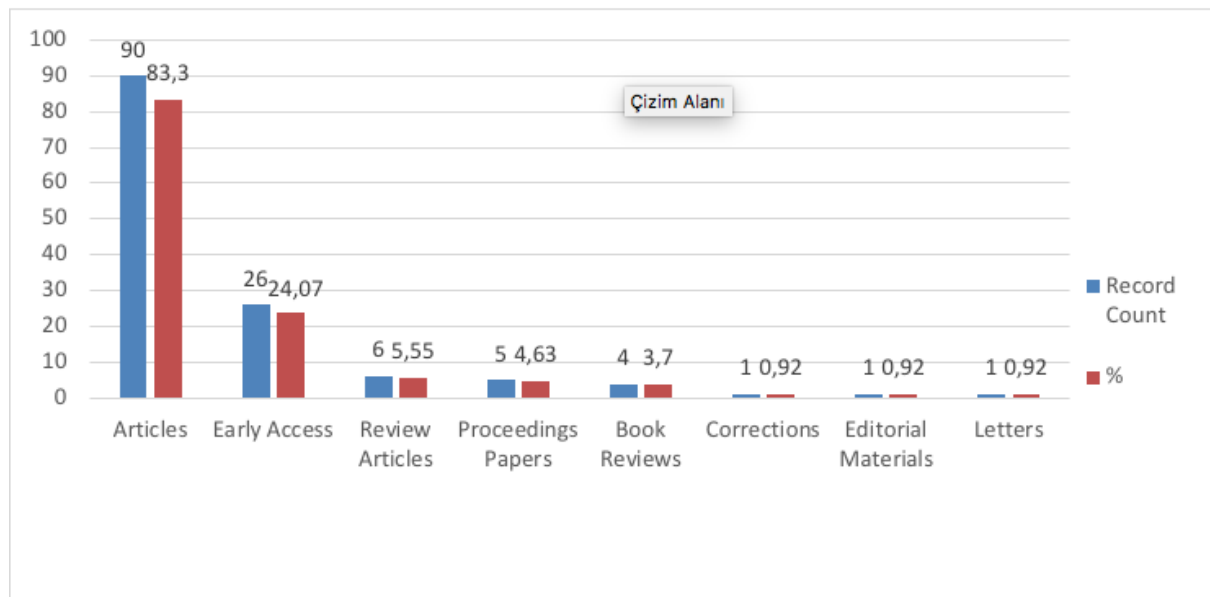


Figure 1. Distribution of Academic Studies by Document Types

Additionally, as shown in Figure 2, 45% (n = 60) of the published studies are indexed in the SSCI index, 26% (n = 35) are indexed in the ESCI index, and 23% in the SCI-Expanded (n = 30) index. Particularly, as shown in Table 4, the highest number of studies (n = 7) were published in the journal of Education and Information Technologies, followed by Computers & Education and IEEE Access journals, each with a rate of 5.5% (n = 6). It should be noted that journals and conferences with less than 2 academic studies were not presented in Table 4.

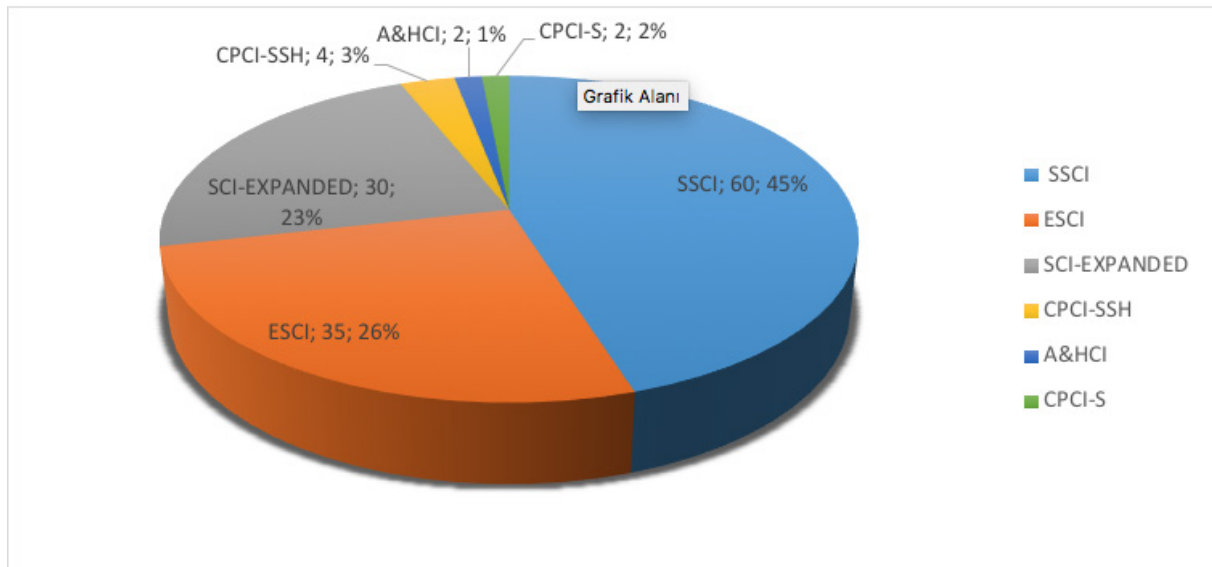


Figure 2. Distribution of Academic Studies by Index

Table 4. Distribution of studies by Journals and Conferences

Conferences/journals	N	%
Education and Information Technologies	7	6.481
Computers and Education	6	5.556
IEEE Access	6	5.556
International Journal of Emerging Technologies in Learning	5	4.63
Computer Applications in Engineering Education	4	3.704
Interactive Learning Environments	4	3.704
14Th International Technology Education and Development Conference Inted2020	3	2.778
Behaviour Information Technology	3	2.778
Educational Technology Research and Development	3	2.778
INTED Proceedings	3	2.778
Journal of Computing in Higher Education	3	2.778
Sustainability	3	2.778
Interactive Technology and Smart Education	2	1.852
International Journal of Technology Enhanced Learning	2	1.852
International Review of Research in Open And Distributed Learning	2	1.852
Journal of Interactive Media in Education	2	1.852
Open Learning	2	1.852
Technology Knowledge and Learning	2	1.852
Turkish Online Journal of Distance Education	2	1.852
Zdm Mathematics Education	2	1.852

Finally, as shown in Figure 3, the most developed MOOCs during the COVID-19 pandemic were in the field of educational sciences (52%, n = 77), computer science (17%, n = 26), engineering (11%, n = 17), and telecommunications (5%, n = 7).

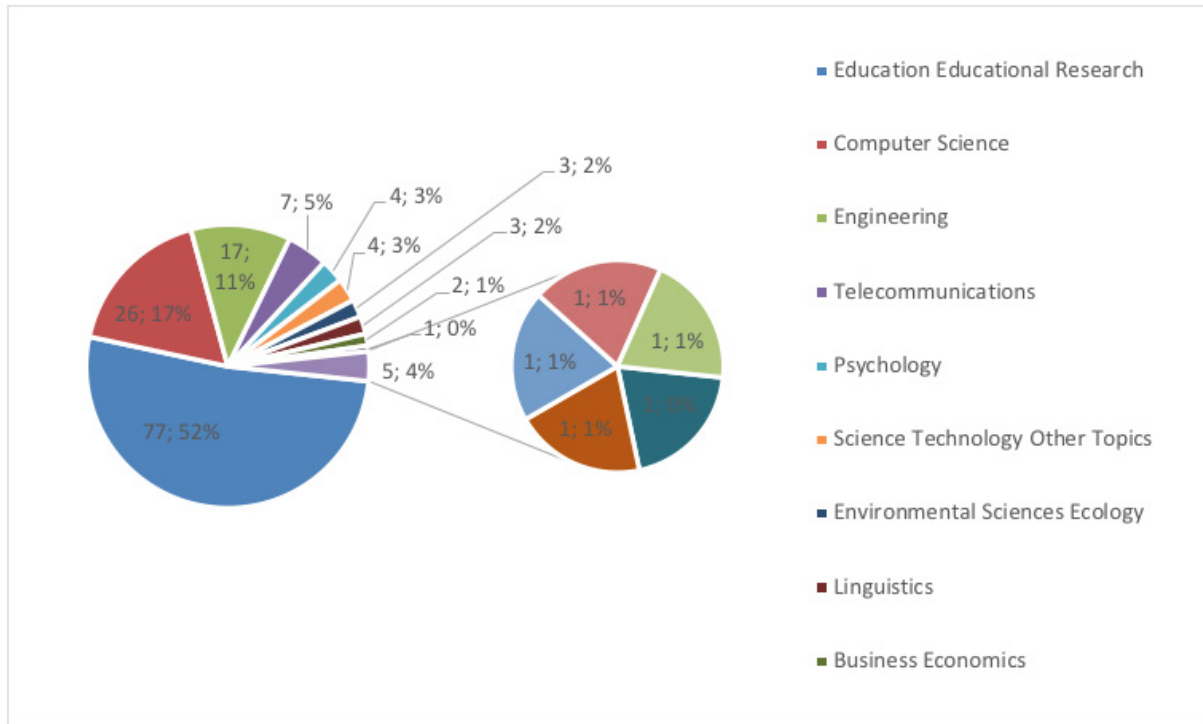


Figure 3. Distribution of MOOCs based on Their Topic

The Frequently Used Terms in the Keywords, Abstracts and Titles of MOOCs Research during the COVID-19 pandemic

As shown in Table 5, the most frequent and strongest keyword was “MOOCs”. The second word with the strongest connection strength is “students”. The third word with the highest connection strength is “motivation”, followed by the terms “engagement” and “performance”. When the common point of all these terms is examined, it can be interpreted that there are trends in academic studies regarding the effects of MOOCs on students’ motivation, commitment and performance during the COVID-19.

Table 5. Most Recurring Keywords and Their Link Strengths

Keyword	Occurrences	total link strength
Moocs	38	121
Mooc	24	59
Students	19	90
Motivation	16	71
Engagement	15	67
Education	13	38
massive open online courses	12	42
e-learning	11	43
Performance	11	46
online learning	10	41
Participation	10	52

To visualize term co-occurrence results in keywords using VOSviewer, the threshold for including a term in the analysis was set as a minimum of five occurrences. This process resulted in the inclusion of 532 terms, where only 37 terms met this threshold. The resulting co-occurrence network map is shown in Figure 4, where three final clusters were obtained in different colors, namely red, green and blue. Specifically, the size of labels and circle depend on the number of occurrences. Lines identify major links between terms, and their thickness, as well as the distance between terms represent the association strength.

In the blue cluster, the terms “MOOCs”, “Motivation”, “Self-determination”, “continuance intervention”, “e-learning”, “motivation” and “distance education” come to the fore. Thus, this cluster emphasizes on motivation and individualization in MOOCs. In the green cluster, the terms “satisfaction”, “model”, “performance”, “online”, “self-efficacy”, “intention”, “adaption”, and “impact” come to the fore. This cluster, on the other hand, investigates the learning outcomes of MOOCs. Finally, the red cluster covers the terms “massive open online course”, “strategies”, “participation”, “behavior”, “quality”, “learning analytics”, and “challenges”. Therefore, this cluster focuses on assessment in MOOCs.

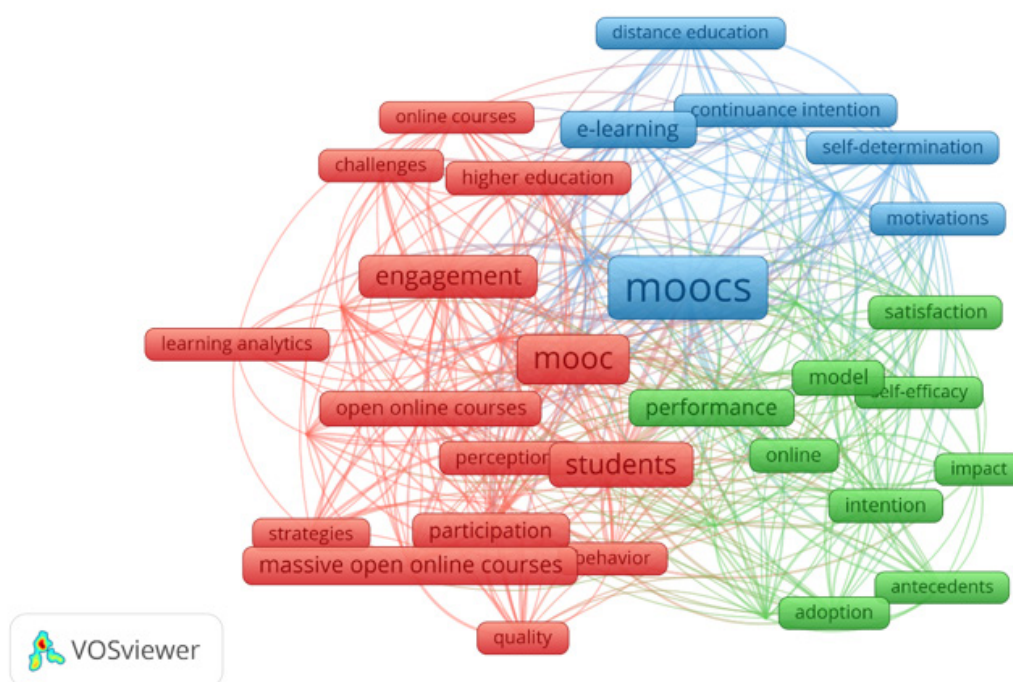


Figure 4. Term Co-occurrence Network Map in Keywords

To further have a deeper understanding of the MOOCs focuses and trends during the COVID-19 pandemic, terms co-occurrence in both abstracts and titles were analyzed. As shown in Table 6, the most common terms are “education”, followed by “participant”, “intention”, “motivation” and “commitment”. This implies that the tendencies of MOOCs studies during the pandemic focused on participants’ intention, motivation and commitment while learning.

Table 6. Most Recurring Terms in Titles and Abstracts, and Their Link Strengths

term	occurrences	relevance score
education	65	1.1113
participant	63	0.8248
intention	55	1.0205
motivation	51	0.6099
engagement	39	1.0879
level	38	0.4969
framework	33	1.1492
university	32	1.5919
process	31	0.953
teacher	31	1.8141

To visualize term co-occurrence results in titles and abstract using VOSviewer, the threshold for including a term in the analysis was set as a minimum of 10 occurrences. Only 38 terms met this threshold. The resulting co-occurrence network map is shown in Figure 5, where five final clusters were obtained in different colors, namely red, green, blue, yellow and purple. Particularly, it can be seen that the purple cluster focused on the perception towards MOOCs during the pandemic, where it included terms, such as “intention”, “motivation”, “satisfaction” and “use”. The red cluster focused more on the learning process using MOOCs during the pandemic, where it covered terms, such as “behavior”, “process”, “way”, “instructor” and “person”. The purple cluster focused on the engagement with MOOCs during the pandemic, where it covered the terms “engagement” and “learner engagement”. The green cluster focused on the context of MOOCs studies during the pandemic, where it covered terms, such as “teacher”, “country”, “university”, and “group”. Finally, the blue cluster covered the challenges of MOOCs studies during the pandemic, where it included terms, such as “barrier”, “lack”, “need”, “participant” and “effect”.

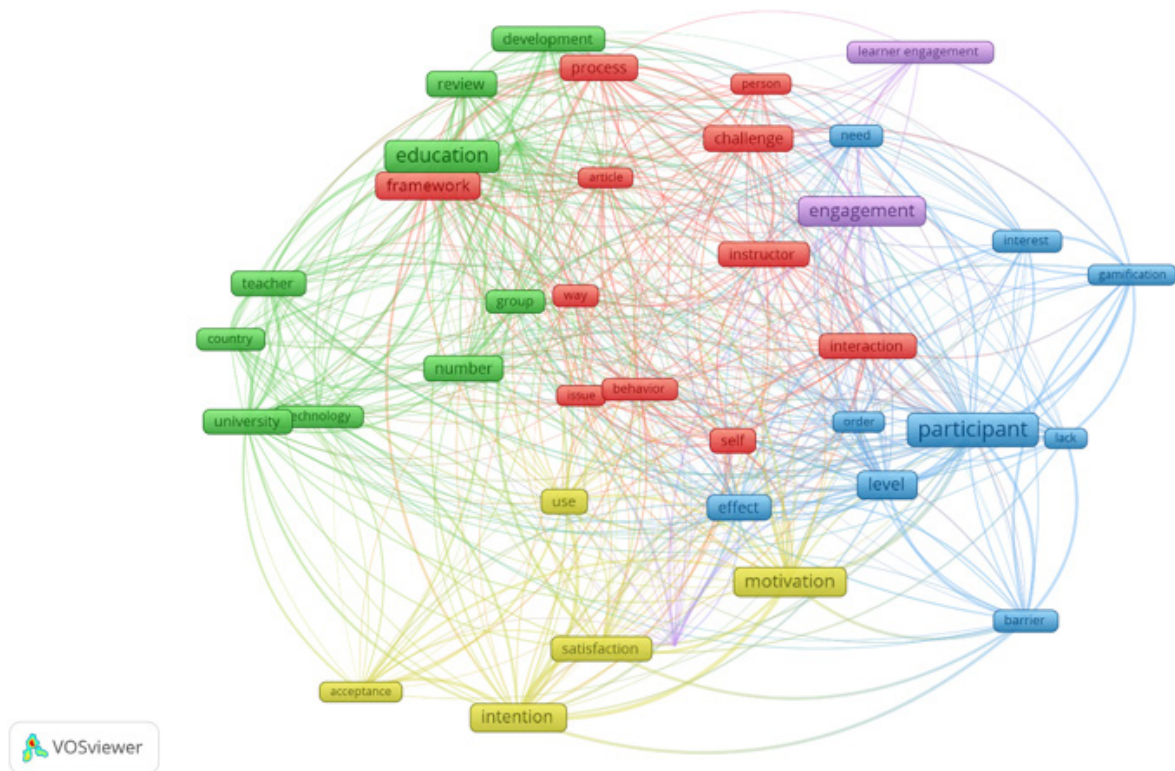


Figure 5. Term Co-occurrence Network Map in Titles and Abstracts

DISCUSSIONS AND IMPLICATIONS

One of the areas in which the COVID-19 pandemic has had a positive impact was the MOOCs movement since all the MOOC providers, even the new ones, such as SWAYAM of India, have all seen drastic growth. According to Class Central, all the major providers have observed between 50 to 200 percent increase in the number of enrollments during the pandemic (Shah, 2020). This increase has also some implications for research studies conducted during this period. Our study focused on these implications.

One of the interesting findings of this study was about the countries contributing to the MOOCs research. It seemed that the COVID-19 pandemic had no effect on the countries that contributed to the MOOCs literature. As it can be observed in Tables 1 and 3, a good number of studies on MOOCs came from China, Spain and USA respectively. In one of the studies conducted just before the pandemic, Zhu, Sari and Lee (2020) investigated 541 empirical MOOCs research published from 2009 to 2019 in order to gain a comprehensive understanding of research methods, topics, and trends of empirical MOOC research. The authors also examined the affiliations of the first authors of the MOOC studies. They found that authors respectively from USA, China, UK and Spain published more studies than others. Hence, our study has shown an ongoing trend in terms of countries contributing to the MOOCs research. This high interest in MOOCs during the COVID-19 pandemic could be due to their feature (Huang et al., 2020a), namely: (1) open and free, hence ensure access to education for everyone without any restrictions; and (2) flexibility, where students can learn according to their own pace, especially during these crises.

Zhu, Sari and Lee (2020) also observed decreases in the number of USA and UK based studies while increases in China and Spain between Phase I (2009-2016) and Phase II (2017-2019). In fact, the percentage of the authors from China had shown a dramatic rise from 8 to 21.3. Our study uncovered the continuity of the same trend during the COVID-19 pandemic. Chinese followed by Spanish researchers still showed interest in MOOCs research more than researchers in other countries during the pandemic. Particularly, it is seen, for instance, that the Chinese government supported the MOOCs initiative by releasing thousands of MOOCs during the pandemic (Huang et al., 2020b). On the other hand, it was interesting to notice that researchers from UK tended to show less interest in MOOC research before and during the pandemic although the number of enrollments to FutureLearn, a UK based MOOC platform, increased 116 percent during the pandemic (Shah, 2020). This might be related to other two concepts and implementations regarding opening up education, Open Education Resources (OER) and Open Education Practices (OEP). The researchers in UK as well as in some other countries seem to show more interest in OER and especially in OEP, as an emerging implementation, lately rather than MOOCs. According to the results of our study, researchers in some of the other countries, such as India, Mexico, Belgium, Italy, Morocco, and Russia, have shown more interest during the pandemic. In fact, these countries were not listed among the countries in the previous study indicated before (Zhu, Sari, & Lee, 2020). In other words, it would be fair to infer that although an ongoing trend about the countries contributed the MOOC research was observed, COVID-19 acted as a catalyzer for researchers in underrepresented countries to focus more on MOOCs research.

One of the unique results of our study was about the publication type due to the fact that a great deal of the previous studies did not look for the publication type. As can be seen in Figure 1, the majority of publications were journal articles (including early access and review types) followed by book reviews during the COVID-19 pandemic. This result can be explained with two major phenomena, namely book writing and production usually take time, and the number of academic events decreased during, especially, the beginning of the pandemic due to the shortage of experience in organizing online academic meetings (e.g., conferences). One of the a few studies included the examination of document type also presented the journal articles as the most preferred publication type followed with book chapters (Duggal & Dahiya, 2020).

Another interesting result of our study was about the rising interest of the technical fields into MOOCs. As shown in Table 4, we observed a quite number of publications in the journals generally publish articles on technical issues, such as IEEE Access and Computer Applications in Engineering Education. Previous studies in the literature usually limits their studies with the publications in the journals related to education or related fields (Babori, 2020; Babori, Fassi, & Zaid, 2019; Bozkurt, Akgun-Ozbek, & Zawacki-Richter, 2017; Veletsianos, & Shepherdson, 2016; Zhu, Sari, & Lee, 2020). Our study as well as a few others from other fields (Bhattacharya, Singh, & Hossain, 2020) have shown that a more diverse fields must be taken into consideration while reviewing the MOOC research including health, engineering, etc.

Figure 3 also supports this finding, where education, especially technology-based learning, was identified as the most frequently investigated topic in the studies during the pandemic. Since the shift from classroom-based education to completely online (emergency remote) learning during the pandemic and issues raised due to this sudden change, such as access, effective pedagogies, right technological infrastructure, efficient and appealing course materials, digital literacy, student and teacher support, etc., it was not evitable to focus by the researchers, as well as practitioners of education. Thus, many researchers not only from the field of education, but also from diverse fields of studies, such as engineering, communications, health, and so forth, tried to explore the potential of MOOCs in formal, informal and non-formal learning processes in their fields (Cha & So, 2020; Lochlainn, Mhichil, Beirne & Brown, 2020; Merzdorf & Douglas, 2020; Setia, Tay, Chia, & Subramaniam, 2019). The following most frequently studies topics are related to the technical fields, respectively computer sciences, engineering and telecommunications. As it has mentioned before, this result also observed in the journals covered MOOCs related studies. In other words, our study has revealed that researchers in technical fields have shown more interest in MOOCs during the pandemic than before. It was most probably related to the growing interest among their students towards participating MOOCs. However, one of the latest Class Central reported a noteworthy observation about the topics the MOOC participants followed (Shah, 2020 December). According to the report, technology-related topics were the most popular among MOOCs participants, but it changed to topics related to the personal development, business, art and design, management and leadership, self-improvement, and humanities. So, that was why we observed more studies on technical fields but it might change if we can re-examine the topics of the research studies on MOOCs in near future.

Retention has been one of the major issues regarding MOOCs since the early days (Breslow et al., 2013; Cormier & Siemens, 2010; Littlejohn et al., 2016; Yuan, Powell & Olivier, 2014; Xing, 2019). Recent studies on retention, or completion ratio in MOOCs (e.g., Chaw & Tang, 2019; Maya-Jariego et al., 2020) presented evidence on positive interaction between learners' engagement, satisfaction and motivation in MOOCs. Our analyses of the keywords, titles and abstracts reflected the retention issue in MOOCs research clearly. Both content analyses as well as co-occurrence network maps have illustrated the importance of retention and related terms, such as motivation, intention, commitment, engagement, participation, self-regulation, etc. Previous studies also indicated a boosting interest in factors affecting the learners' motivation to complete MOOCs. According to Zhu, Sari and Lee (2020), for example, the specific research topics that had the biggest increase between Phase I (2009-2016) and Phase II (2017-2019) were retention and completion (from 14 to 29), motivation (from 3 to 20), and engagement (from 11 to 23). In the light of these results, it would not be wrong to claim that during the pandemic, the MOOC research mainly showed a tendency toward evaluating learners' motivation to complete MOOCs they were enrolled in so as to measure the success rate of MOOC programs.

CONCLUSIONS, LIMITATIONS AND FUTURE DIRECTIONS

The main purpose of our study was to investigate the trends in MOOC research during the pandemic. More specifically the study intended to find out (1) the countries of the researchers who contributed the most to MOOCs research during the COVID-19 pandemic, (2) the distribution of MOOCs research during the COVID-19 pandemic in terms of document type, index and topic, and (3) the frequently used terms in the keywords, abstracts and titles of MOOCs research during the COVID-19 pandemic.

The study revealed an ongoing trend in terms of countries contributing to the MOOCs research during the COVID-19 pandemic: researchers in China and Spain especially showed more interest in MOOCs research than other countries same as before the pandemic. Researchers in USA have also contributed the literature. On the other hand, this study has also presented evidence about growing attention in MOOCs among less represented countries (e.g., Mexico, India, Morocco) during the pandemic compared to those once dominated the literature, such as UK, Netherland, Germany, etc. In addition, journal articles were the most preferred publication type due to the fact that others like books takes a quite time to be published. Moreover, the study has also uncovered another ongoing trend about the topics focused on MOOC research: factors affecting the learners' retention or completion ratio and relate topics, such as self-regulation, motivation, intention, goal-orientation and so forth have been the most often studied variables in MOOCs research during the pandemic.

This study provides some hints for future research. For instance, it was interesting to observe the growing interest in MOOCs research in underrepresented countries. It would be interesting and beneficial to examine why and how these countries focus on MOOCs. Rather than a quantitative approach a more qualitative might help develop get better insight about their motives and ways to benefit from MOOCs. Another research idea about MOOCs would be investigating the practitioners' perspectives about MOOCs rather than just researchers' perspectives. In general, it would be fair to state that the field of technology-based learning (TBL), of which MOOCs can be considered as a subset, is an applied science. Thus, we as researchers should not forget the practice of MOOCs and concentrate on the effective, efficient, engaging and enduring (4Es) implementations. For instance, a repetition of the Chickering and Gamson's (1987) study on effective principles of college teaching in MOOCs might help MOOC designers and researchers.

Despite the solid ground that this study provided about MOOCs and the COVID-19 pandemic, it still has some limitations that should be acknowledged. For instance, this study conducted only a bibliometric mapping analysis of the obtained results. Additionally, no data was collected from stakeholders, including teachers, students and policy makers. As several research studies have revealed the importance of Open Educational Resources (OER) and Practices (OEP) in enhancing students' motivation during the pandemic (Zhang et al., 2020), future research direction could focus on investigating how to integrate OEP into MOOCs design for better retention rates and learning outcomes.

BIODATA and CONTACT ADDRESSES of AUTHORS



Dr. Ahmed TLILI is an Associate Professor at Beijing Normal University, China and Adjunct Associate Professor at An-Najah University, Palestine. He is also a Visiting Professor at UNIR, Spain and the Co-Director of the OER Lab at the Smart Learning Institute of Beijing Normal University (SLIBNU), China. He serves as the Editor of Springer Series Future Education and Learning Spaces. He also serves as the Associate Editor of the Smart Learning Environments, IEEE Bulletin of the Technical Committee on Learning Technology, and the Journal of e-Learning and Knowledge Society. Prof. Tlili is also an expert at the Arab League Educational, Cultural and Scientific Organization (ALECSO). Prof. Tlili has edited

several special issues in several journals. He has also published several books, as well as academic papers in international referred journals and conferences. He has been awarded the Martin Wolpers 2021 Prize by the Research Institute for Innovation and Technology in Education (UNIR iTED) in recognition of excellence in research, education and significant impact on society. He also has been awarded the IEEE TCLT Early Career Researcher Award in Learning Technologies for 2020.

Ahmed TLILI
Smart Learning Institute of Beijing Normal University
Address: Beijing Normal University, Beijing 100875, China
Phone: +86 13269907884
E-mail: ahmedtlili@ieee.org



Dr. Fahriye ALTINAY is Vice Director of Institute of Graduate Studies at Near East University. She is Vice Chair of Societal Research and Development Center. She is head of department of computer education and instructional technology. Fahriye Altinay is the member of academic journals and she has national and international books, publications and research projects. Prof. Dr. Fahriye Altinay is member unobstructed information technology platform. She actively works in her studies about disability in smart society. Current researches consider the importance of diversity management, sensitivity training, disability, global citizenship for smart society.

Fahriye ALTINAY

Societal Research and Development Center, Faculty of Education

Address: Near East University, Turkish Republic of Northern Cyprus, Mersin 10 Türkiye

Phone: +90 392 680 2000-515

E-mail: fahriye.altinay@neu.edu.tr



Dr. Zehra ALTINAY is Director of Educational Sciences Department at Faculty of Education. She is Chair of Societal Research and Development Center at Near East University. She is director of ethical committee in the field of educational sciences. Zehra Altinay is the member of academic journals and she has national and international books, publications and research projects. Zehra Altinay is director of monitoring rights of people with disability. Her research interests are online education, management, disability and higher education.

Zehra ALTINAY

Societal Research and Development Center, Faculty of Education

Address: Near East University, Turkish Republic of Northern Cyprus, Mersin 10 Türkiye

Phone: +90 392 680 2000-515,

E-mail: zehra.altinaygazi@neu.edu.tr



Dr. Cengiz Hakan AYDIN, PhD is a full professor in Anadolu University of Türkiye where he has been offering courses in the field of open and distance learning since early 1990s such as Designing Open and Distance Learning (OLD), Instructional Design, and Research on ODL. He is currently the chair of the Distance Education Department in Anadolu University, and the director of the Anadolu University's Open Anadolu Project (including AKADEMA MOOCs platform). In the past, Professor AYDIN had also served as instructional designer in the Open Education System of the University until September 2017 and as the dean of one of the major ODL faculty of the University between 2013-2016. His current research interest focuses on design and

development of ODL environments, integration of new technologies into ODL, Open Education Resources (OERs), Open Education Practices (OEPs) and Massive Open Online Courses (MOOCs). Professor AYDIN served as the President and the Board Member of the International Division of AECT, as one of the board member of the International Council for Educational Media (ICEM). Professor AYDIN has been a member of editorial boards of the journals, the International Review of Research in Open and Distance Learning (IRRODL) and Educational Media International (EMI). He is currently serving as a member of the steering committee of OpenupEd, an initiative of the European Association for Distance Teaching Universities (EADTU), member of the International Council for Distance Education's (ICDE) Advocacy Committee for OER (OERAC) and member of the Center for Open Education Research (COER).

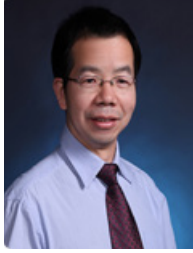
Cengiz Hakan AYDIN

Open Education Faculty, Office # 614

Address: Anadolu University, Tepebasi, Eskisehir, 26470, Türkiye.

Phone: +90-222-335-0580

E-mail: chaydin@anadolu.edu.tr



Dr. Ronghuai HUANG is currently a Professor in Faculty of Education and Dean of Smart Learning Institute in Beijing Normal University, the Director of UNESCO International Rural Educational and Training Centre and the Director of National Engineering Lab for Cyberlearning and Intelligent Technology. He serves as Vice Chairman of China Association for Educational Technology; Vice Chairman of China Educational Equipment Industry Association; Deputy Director of Collaborative and Innovative Center for Educational Technology; Director of Digital Learning and Public Education Service Center; Director of Professional Teaching and Guiding Committee for Educational Technology; Director of Beijing Key Laboratory for Educational Technology.

Ronghuai HUANG

Smart Learning Institute of Beijing Normal University
Address: Beijing Normal University, Beijing 100875, China
Phone: +86 10 58807264
E-mail: huangrh@bnu.edu.cn



Dr. Ramesh SHARMA is a faculty for Instructional Design and Chairperson of the Committee to facilitate adoption of online courses for SWAYAM MOOCs platform of the Govt of India, at Dr B R Ambedkar University Delhi. Earlier he has taught Educational Technology and Learning Resources at Wawasan Open University, Malaysia. He is an expert in open and distance and technology mediated learning and has served as a visiting Professor at Universidade do Estado da Bahia, UNEB, Salvador, Bahia, Brazil, visiting Professor at University of Fiji, Fiji, Commonwealth of Learning as Director of the Commonwealth Educational Media Centre for Asia, New Delhi, Regional Director of Indira Gandhi National Open University, India and Director of Distance Education at University of Guyana, Guyana, South America. He is the Editor of Asian Journal of Distance Education (launched in 2003) and has been associated with several other peer reviewed journals including SSCI / SCOPUS Journals as Reviewer, Editor and Editorial Advisory Board member in the field of Open and Distance Learning. An author/editor of several books and research papers on educational technology, educational multimedia and eLearning, Dr. Sharma is a practitioner promoting Open Educational Resources (OER). He has been a trainer and capacity builder in the field of educational technology, and has supervised doctoral research in the field. He has conducted workshops and evaluation activities for Indira Gandhi National Open University; Commonwealth of Learning, Canada; Commonwealth Educational Media Centre for Asia, New Delhi; United Nations Conference on Trade and Commerce (UNCTAD), Geneva; and Aga Khan Foundation, amongst others.

Ramesh SHARMA

School of Global Affairs
Address: Dr B R Ambedkar University Delhi, New Delhi - 110015, India
Phone: +91-11-25192175,
E-mail: rc_sharma@yahoo.com

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