A TEN-YEAR BIBLIOMETRIC NETWORK REVIEW ON MASSIVE OPEN ONLINE COURSES (MOOCs) RESEARCH: 2011-2020

Dr. Chinun BOONROUNGRUT

ORCID: 0000-0001-8162-1295
Faculty of Education
Silpakorn University
Nakorn Pathom, THAILAND

Dr. Wulan Patria SAROINSONG

ORCID: 0000-0002-6326-0753
Faculty of Education
State University of Surabaya
Surabaya, INDONESIA

One KIM

ORCID: 0000-0002-0299-8800
Zaehoon Language Institute
Bangkok, THAILAND

ABSTRACT

Massive open online courses (MOOCs) have also received interest from researchers worldwide; however, there was no comprehensive review of the MOOC research. This paper aims to identify the MOOCs research scientific landscape as the trend from publications worldwide. In assessing research trends, the bibliometric network analysis using distance-based network mapping in VOSviewer was applied in this review. The 3,211 eligible articles published between 2011 and 2020 confirmed three main research clusters: learning system, human characteristics and higher education clusters. The results also showed that terms, such as 'learning systems', 'gender differences' and 'flipped classroom' emerged as ongoing research trends. In addition, these findings indicated that the overall productivity rates in the Middle East and Gulf regions were low. Besides, the authorship mapping indicated an absence of the small-world properties. A discussion of the findings and directions for further research are also provided. Based on the network analysis method, this paper presents the researchers' alternative method to review literature using an approach that possibly includes mostly published articles related to MOOCs.

INTRODUCTION

Since 2002, open education resources have been introduced in the United Nations Educational, Scientific and Cultural Organization's forum on open courseware (Chiu, 2016; Daradoumis, Bassi, Xhafa, & Caballe, 2013). The forum has provided educators worldwide with a wide range of opportunities to improve the quality of education and facilitate better learning amongst their students. This has also allowed the designing of open licence learning in any media format, which could be placed in the public domain, can be easily accessed, are free to use, and/or with limited restrictions. Massive open online courses (MOOCs) have shown great potential to offer free and open courses, with open-ended outcomes, for a massive number of

learners from anywhere as long as they have an Internet connection (McAuley, Stewart, Siemens, & Cormier, 2010). Nowadays, learners can enrol in an MOOC system to receive learning materials, interact with the course providers and share their feedback, including knowledge with their classmates, as active learners.

Although the Internet-enhanced learning model was developed in the past century, it was only in 2008 when MOOCs became widely popular after George Siemens and David Cormier identified it as 'connectivism' and 'connective knowledge' (Zhu, Sari, & Lee, 2018). With the use of online technology, MOOCs have become increasingly effective in higher education and even lifelong learning. Since then, MOOCs have received significant attention, presenting a dramatic increase from thousands of participants in the early years of the system's development (Jordan, 2014) to at least 110 million participants engaged in 13,000 courses offered by 900 host institutes and providers around the world by the year 2019 (Shah, 2019; Si, 2020). To categorise MOOCs, Downes (2008) explained it into two main types: distributed networks for online resources via existing social media sites (cMOOCs) and well-structured pathway resources on MOOC platforms (xMOOCs).

Unsurprisingly, many researchers have shown interest in studying the effectiveness of methods, the structures of learning and learners' interaction, because most MOOC systems either still follow the structure of traditional higher education or other commercial platforms, such as Coursera and Edx. Based on the MOOC students' interaction data pool, we can gain a deep understanding of learners' needs and learning patterns and how they can better achieve their goal using the MOOC system than the traditional delivery method, thus presenting greater potential to significantly impact the current state of higher education systems around the world (Gasevic, Kovanovic, Joksimovic, & Siemens, 2014). MOOC educators understand their leaners from their courses, which offer specialised learning materials, assessments and certificates for those who complete their given activities by the course deadline (Yuan & Powell, 2013). Thus, learners are required to be self-autonomous and self-motivated, because MOOCs do not monitor learners unlike in the traditional mode of learning, such as regular online courses. Thus, self-regulation is considered an important factor in becoming a successful MOOC learner (Boonroungrut & Saroinsong, 2020; De Barba et al., 2020).

Various MOOCs aim to support society from the large impact of massive learners, not only in the area of general learning but also some specific groups of participants in many communities that face huge challenges from rapid urbanisation (Hudson et al., 2019). Those courses were designed to educate the public in terms of shaping norms and attitudes leading to social change. In this context, MOOCs reinforce the concept of democratisation of teaching, which equally provides learning opportunities regardless of social status (Aljaraideh, 2019). For example, the World Bank has allocated financial courses for the development and engagement of the related African MOOCs to improve economic skills (Boga & McGreal, 2014; Bonk, Lee, Reeves, & Reynolds, 2015) or support the provision of medical knowledge, such as in patients living with dementia. Past studies have confirmed the large-scale public health impacts of MOOCs on the society and demonstrated that MOOCs could be employed to handle other health conditions requiring attitudinal changes, such as diabetes, obesity, heart disease, cancer, stroke, addiction and some mental disorders (Robertshaw & Cross, 2016; Robertshaw & Kotera, 2020).

PREVIOUS REVIEWS ON MOOCs

During the past few years, MOOCs have undoubtedly gained huge public interest. Researchers have focussed on exploring many aspects and trends related to online educational technology. To understand the overall knowledge of our MOOC literacy, extensive reviews have been conducted in many points of time. To explore our MOOC literacy, these examples are the most cited reviews. Liyanagunawardena, Adams, and Williams (2013) explored 45 MOOC publications between 2008 and 2012 and categorised these into eight areas of interest; introductory, concept, case studies, educational theory, technology, participant focussed, provider focussed and others. Ebben and Murphy (2014) reviewed 25 articles published between 2009 and 2013 showing two movement phases: Phase I from 2019 to 2012, with technological experimentation and innovation of cMOOCs supporting the development of connectivism theory, and Phase II from 2012 to 2013 with the development of the MOOC pedagogy platform, learning analytics, assessment and the emergence of critical discourse. In addition, Hew and Cheung (2014) summarised the reasons why students enrolled and teachers wanted to teach in the MOOC from 25 eligible articles. They found that the four main

purposes of students who enrolled in MOOCs included the personal desire to extend the current knowledge, interest in MOOCs, personal challenge and the need to obtain a certificate. In comparison, the teachers' main goals were curiosity (a sense of intrigue), personal rewards and a sense of altruism. That review also indicated that 90% of drop-outs can be attributed to the difficulty of assignment evaluation, the absence of immediate feedback and a lack of students' online forum participation.

 Regarding the common research review methods adopted by researchers, Veletsianos and Shepherdson (2016) investigated 183 empirical studies published between 2013 and 2015 to specifically explore the geographic distribution, publication outlets, citations, data collection and analysis methods. The publications mostly came from North America and Europe, but half of those papers were not cited. Conducting surveys emerged as the researchers' preferred method of collecting data. Deng, Benckendorff, and Gannaway (2017) confirmed that surveys, interviews and log files were researchers' data collection methods based on their review of 95 articles published between 2014 and 2016. They found that participants were well-educated and were mostly from developed Western countries. Deng and Benckendorff (2017)' review found that focus groups were less common and that studies applied a single research method to explore some outputs in MOOC research.

Rincon-Flores, Montoya, and Mena (2019) reviewed 30 articles published between 2013 and 2019 using gamification in MOOCs. The results revealed interesting findings, which highlighted the raising of innovative didactic strategies in gamification. Guajardo Leal, Navarro-Corona, and Valenzuela Gonzalez (2019) explored 20 conference papers and 70 research articles published between 2015 and 2018. The publications, which were mainly from the United States, Australia and the United Kingdom, mostly employed qualitative methods with an exploratory approach. Providing examples of reviews related to psychological factors, Ahmad and Yusof (2019) found three main motivations (enjoyment, professional development and reputation enhancement) from perspective studies on 39 instructors between 2015 and 2018.

All these example review studies demonstrated that MOOC research and concurrent trends were rapidly changing by each year since the introduction of this learning mode (Veletsianos & Shepherdson, 2016); however, those reviews only collected data in specific topics from different times and databases. Thus, they could not present a comprehensive picture of the state of MOOC research. Importantly, it could be argued that most of those reviews provided outcomes from a low number of articles compared with the huge number of publications in all related topics. Thus, to visualise an overview of the proliferation of MOOC publication terms, bibliographic network analysis is applied. The main purpose of this review is to explore MOOC research trend using research occurrence terms, co-occurrence authorship and country authorship in the past decade. Thus, the questions pursued by this review were:

1. What are the researchers' updated trends on publications related MOOCs?
2. Who are the most productive authors who published articles related MOOCs?
3. What countries are the world leader in publications and their most cited documents related MOOCs?

METHOD

Data Samples

Scopus database was chosen in this review because it was the largest abstract and citation database of peer-review literatures (Wamba & Akter, 2015). To select the eligible papers, PRISMA guideline was adopted (Beller et al., 2013). All 3,638 publications, which were indexed in the all Scopus databases, focussing on Massive Open Online Courseware with the term's 'MOOC' OR 'MOOCS' OR 'Massive Open Online Courseware' in their titles, abstracts or keywords were found; however, they were with at least one of those keywords that must be explicitly stated in their titles as the screening condition. Original research articles, and conference papers were selected. Book chapters, reviews, editorial and other types of publications were not target in this review. The samples were published between 2011 and 2020. Thus, the samples consisted of 3,211 articles in the final stage. Information about authors and co-authors including their affirmations was also collected. They were published by 279 authors and co-authors and cited by 10,280 other documents.
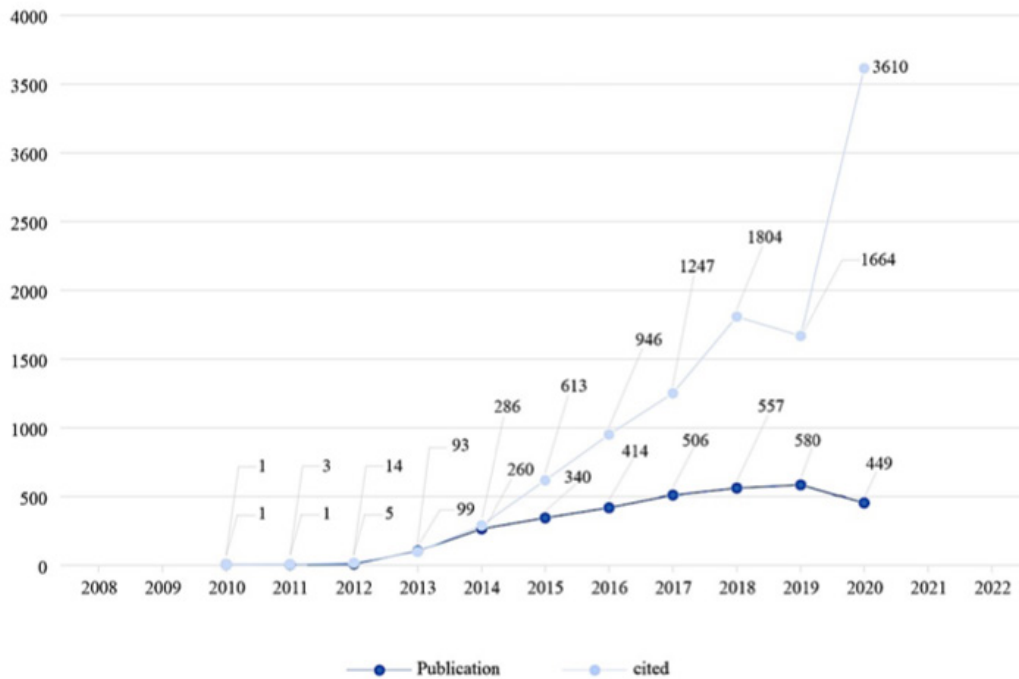
Figure 1. Frequencies of publications and their citations per year

The samples were published in 171 journals. Among these, the three preferred journals that gained the most interest from researchers were *International Review of Research in Open and Distance Learning* (6.27% of all samples), followed by *International Journal of Emerging Technologies in Learning* (2.61%) and *Computer and Education* (2.32%). These samples were mostly cited in *Lecture Notes in Computer Science* (3.41% of all cited articles). In terms of citations, the *International Review of Research in Open and Distance Learning*, which was at the top in terms of published documents, appeared as the third-ranked journal (2.30%). Scholars from the United States (24.69%), China (13.88%) and Spain (12.55%) were the top three leaders in this field. Universidad Nacional de Educacion a Distancia (Spain), Universidad Carlos III de Madrid (Spain) and Pennsylvania State University (U.S.) were the world-leading universities in terms of publishing works on MOOCs. However, the most cited published articles were from the Open University (U.K.).

Data Analysis

The bibliographic network technique was applied to visualise a map of co-occurrences that can possibly present the research topics as nodes. They might be close to one another on the map based on the network calculations. To see how VOSviewer statistics work on a similarity meteix, a cluster translation, rotation and reflection degree behind these distance-based network maps, please study in Van & Waltman (2010). In this study, authors' keywords were shown without the most frequent key term 'MOOC' and its related words. Its omitted keywords could provide a better cluster among all authors' keywords. The mapping units and their relations were represented using circles were and lines, respectively, to link those units as nodes. The size of a circle was calculated based on the number of articles and terms. This study presented two kinds of mapping, including a cluster network mapping and an overlay visualisation mapping. The colours of a circle represented each cluster and its membership in the cluster mapping. The spectrum of colours represents the average publication month and year in the overlay mapping. Additionally, the relations among authors' and co-authors' network mapping were also presented based on the similarities of the documents they cited. To visualise the trends from the authors' respective schools, those who cited the same document were placed near each other on this mapping. Additionally, a country and co-country mapping, presented by the number of documents, demonstrated how researchers collaborated through their different institutions.

Notably, the layout of the bibliometric mapping could be affected by the ease of interpretation, which showed highly frequent units. Some topics could be less interpretable and unclear, as shown in the visualisation. Thus, we applied several methods to avoid any serious arbitrariness. The preliminary analysis was conducted using a variety of occurrence threshold selections, after which we selected the mapping that presented robust visibility of the main trends. The inconsistent solutions were discarded. The samples were analysed and visualised using VOSviewer v.1.16.13 in MacOS. Fractional weight and Lin-Log modularity were used for each unit's normalisation. The map of authors' keywords was calculated from a minimum of 25 occurrences per term presenting 64 thresholds from 6,001 keywords. A map of authors and co-authors included 52 authors who published more than five papers.

FINDINGS

The co-occurrence map based on authors' keywords presented three main recognised clusters which researchers have already published, as shown in Figure 2. The first cluster (green colour–upper left) mostly included the big nodes on education and terms related to the learning system, leaning analytics and e-learning. It was the biggest cluster compared to the two other clusters. The second cluster (blue–right) included thresholds related to human and human–computer interactions. The third cluster (red–lower) seemed to be narrow; however, it included terms from different approaches, which included 'distance education' and 'online education technology', and from alternative learning systems, such as 'blended learning', social media' and 'flipped classrooms'. Considerably, the first and third clusters were closer to each other, which might represent how researchers gathered terms in closely related approaches.
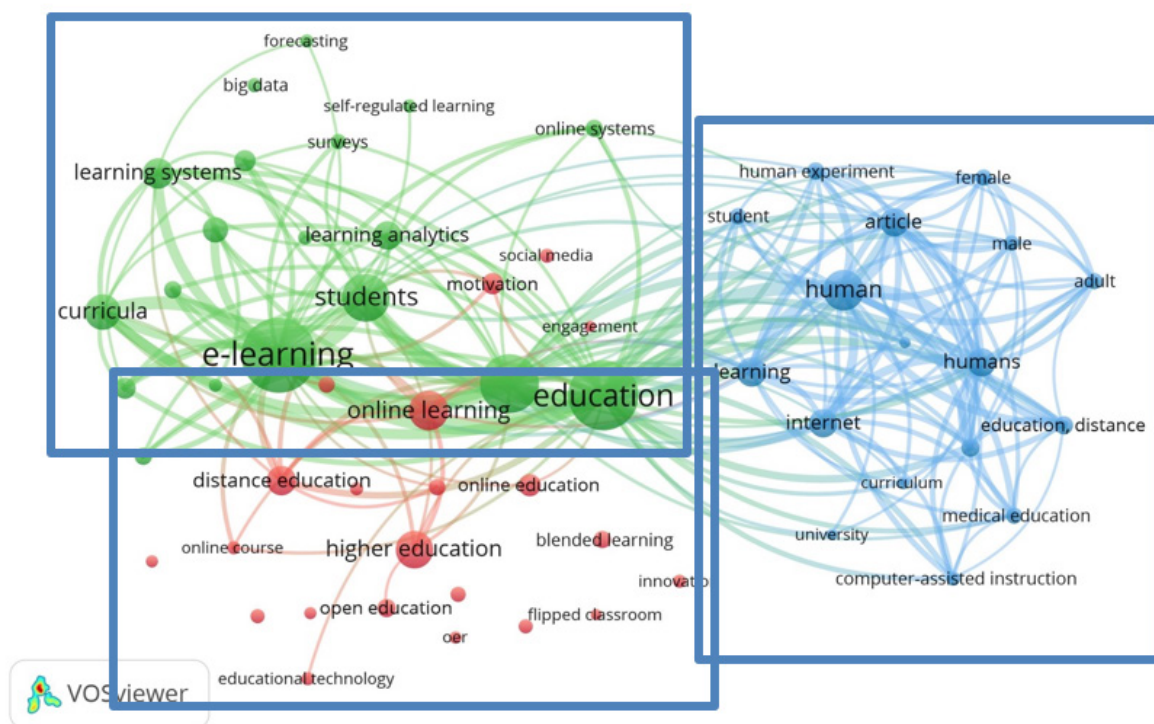
Figure 2. Map of the co-occurrences of author keywords

As presented in Figure 3, the latest terms were mostly in the first and second clusters. In comparison to Figure 2, most terms generally appeared in the database after the 2016 publication year. Learning systems and learning analytics, including big data, survey, forecasting, and self-regulated learning, belong to the newest publication terms from the first cluster. The newest terms from the second cluster clearly favour the

characteristics of the studied samples and experiment research method. Another cluster gathered the newest terms, such as 'flipped classroom' or 'blended learning', which referred to e-learning and distance learning innovation. Topics on the Internet and computer-assisted instruction were excluded from the researchers' interests.
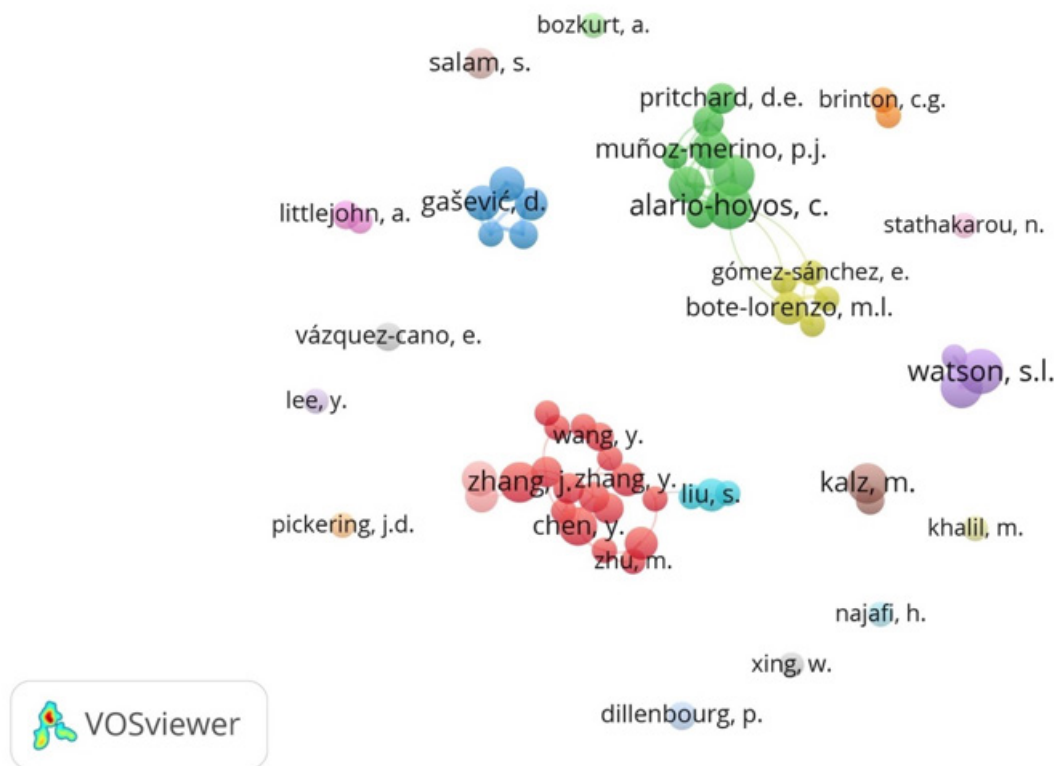

Figure 3. Overlay map of the co-occurrences of author keywords

To address the trend from the productive authors and co-authors, Figure 4 shows several unconnected distinct groups of them that could possibly represent different research directions. There were at least five clearly recognised groups of authors. Of these, the centre groups that combined two groups had the largest number of papers, although most articles belonged to the Alario–Hoyos, C. cluster (2.42% and registered in the blue cluster). Table 1 confirms his publication continuity during this decade.

We further explored the three biggest clusters. The centre position, which was compounded from their similar citation metrics, mainly included Brown, M.; Zhang, J.; Chen, Y. and Anderson, T.; and Liu, S., Bonk, C. J. and Joblokow, W. These groups studied the terms regarding students' psychological factors, such as motivation, engagement and other related personal perspectives. In the network around Alario–Hoyos, C., which included the main works of Pritchard, D. E., Klood, C. D and Munoz–Merino, P. J., there existed a prevalence of terms related to computer program learning designs, learning analytics and learning strategies. In the network around Gasevic, D., Jokesimovic, S., Kovanovic, V. and Dowson, S., social domains and MOOC learning evaluation were found. The results of this analysis could be a shred of evidence proving that researchers' tend to collaborate less with other researchers from different institutions across different countries. Meanwhile, this analysis also confirmed the transfer of knowledge from the researchers in the same country.

Figure 4. Authorship network mapping

Table 1. Unweighted author productivity

Presenting top productive authors							
2011 – 2015	Ndoc		2016 - 2020	Ndoc		2011 - 2020	Ndoc
Alario-Hoyos, C.	5		Watson, S.L.	15		Alario-Hoyos, C.	16
Anderson, T.	4		Watson, W.R.	13		Watson, S.L.	15
Kloos, C.D.	4		Alario-Hoyos, C.	11		Kloos, C.D.	13
Rodriguez, C.O.	4		Kalz, M.	11		Watson, W.R.	13
Sangra, A.	4		Kloos, C.D.	9		Kalz, M.	12
Acosta, E.S.	3		Gasevic, D.	8		Munoz-Merino, J.	11
Bonk, C.J.	3		Munoz-Merino, J.	8		Perez-Sanagustin,	10
Chatti, M.A.	3		Perez-Sanagustin,	8			
Gonzalez-Sanmam	3						
Jordan, K.	3						
Munoz-Merino, J.	3						

Note: *A total of 19 researchers published at least three articles during 2010–2015, showing only those who were in the ranking in the later periods.*

To identify the world leader in this fields of knowledge, the country network presented a global overview of the leading countries based on the number of documents and citations within a ten-year period between 2011 and 2020. The leading countries throughout the time, as shown in Figure 5, presented seven classified clusters of those countries, including four major and three minor clusters. Without weighing in terms of the population in each region, counting by the number of total documents, researchers from the U.S. and China together with Taiwan, Hong Kong and South Korea (yellow) were clearly leading in MOOC research. Interestingly, Spain had published more relevant articles with other Latin American countries whilst commonwealth countries, including the U.K. (a violet node next to the U.S.), Canada, Australia and other Western Europe and Scandinavian countries, tend to collaborate closely with one another. These countries was not only the most productive in terms of number of publication, but also indicate high *h*-index. In addition, in Figure 6, we further analysed this mapping using the number of citations. This mapping visualised differences that highlighted a large number of citations from the U.S., U.K., Spain and Australia, respectively. Meanwhile, publications from China were less cited compared to the total number of all documents in the database.
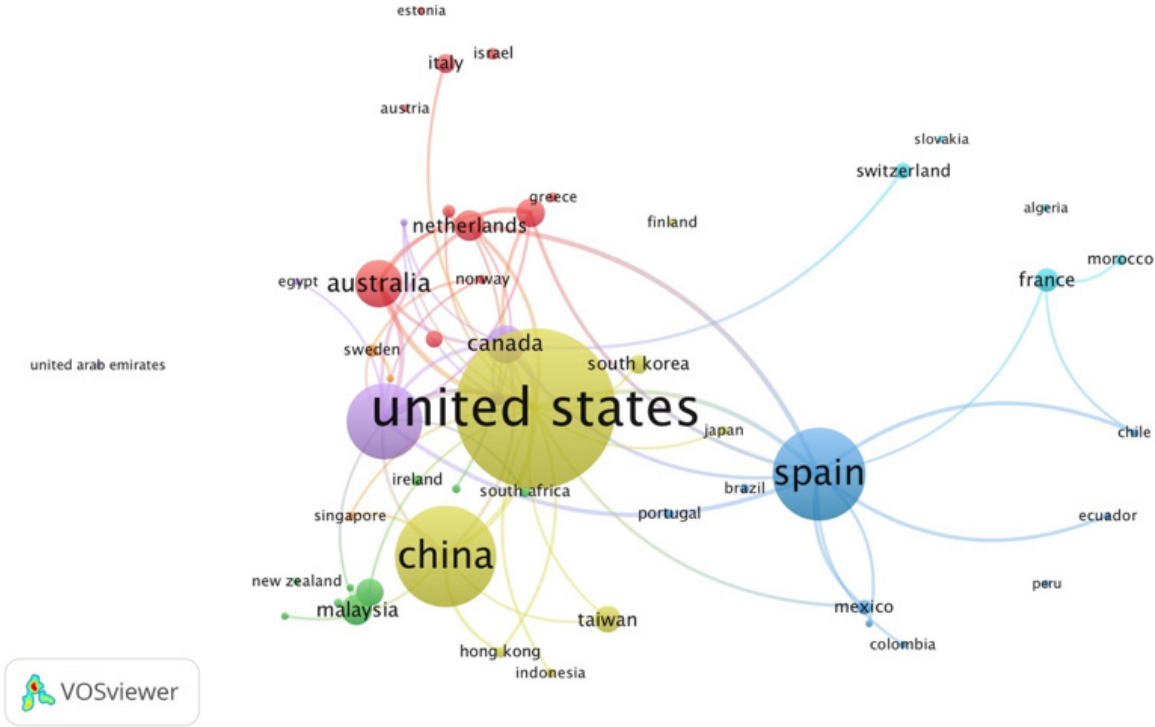

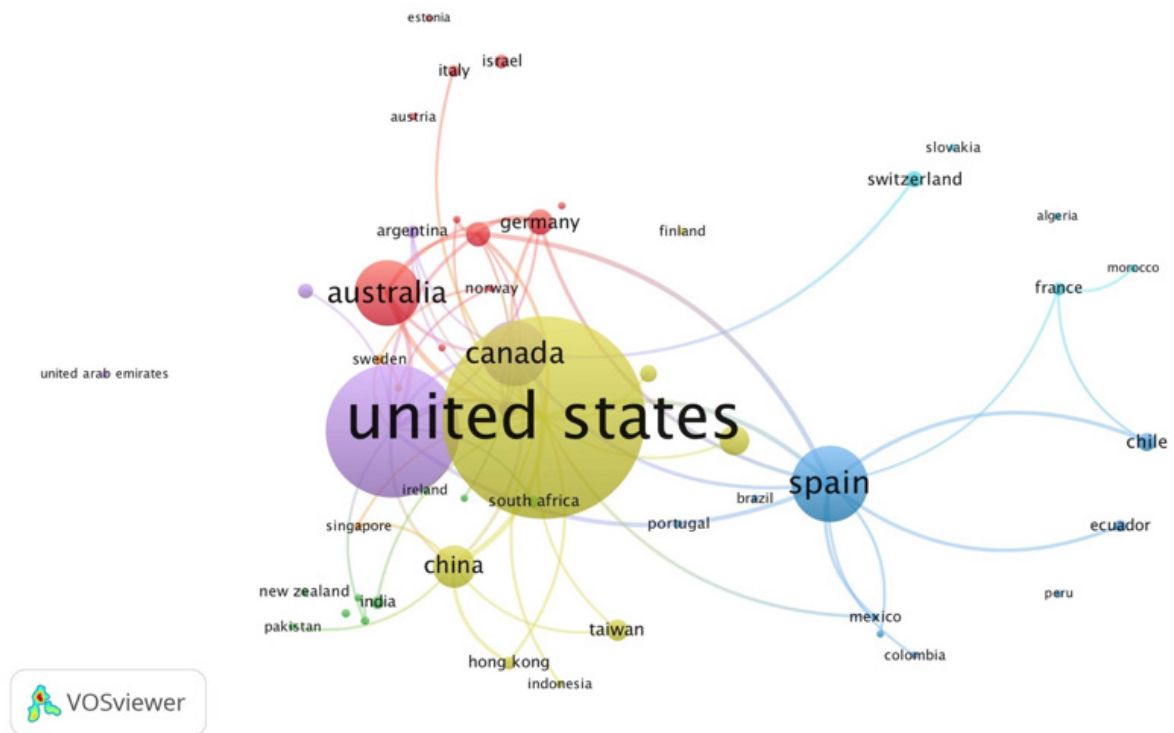**Figure 5.** Co-authorship country mapping based on counting by documents

Figure 6. Co-authorship country mapping based on counting by citations

DISCUSSIONS AND CONCLUSION

Since the term MOOC was introduced in the first decade of the 21st century, it has been rapidly applied as the new educational technology in the field of education. During this ten-year period, citations on documents regarding MOOC increased amongst global researchers, indicating a rate that is almost 3 times higher than the number of publications each year. Under this online learning process, course providers receive information about learners from their interactions with the online learning programmes or platforms although most researchers declared difficulty in receiving students' information due to the limitations imposed by students' privacy regulation and data protection. Some concerns and criticisms have been raised in terms of how researchers can improve this learning mode effectively (Griesbaum, 2014). To assess the current research coverage, this review focussed on identifying the main trends, including determining the gaps regarding MOOC-related publications from the selected 3,211 Scopus-indexed journal articles from the underlying themes, authors and country references.

There was total of 71 reviews and conference reviews in the Scopus database which published up to December 31, 2020. They were mostly published reviews were in 2017 (18.30%), 2019 (18.30%) and 2015 (12.67%). According to the present findings using density mapping, it could be interpreted that those nodes in Cluster 2 and some upper nodes in Cluster 1 received highly researchers' interest to make review. Although the centre nodes was not in their early stage, they were undeveloped to be reviews. This gap of knowledge could be fulfilled by future researcher. However, there was an argument that why those research have not been remarked as an eminently reference was published a medium-to-low impact index. They did not reflect for the analysis of MOOC movement, especially the publications before 2013 (Meneses, Cano & Gravan, 2015).

The findings regarding the authors' keywords indicated three distinctive clusters as the research trend. Providing examples to draw a brief overview in those clusters, some highly interesting review articles and research papers were presented. The centered keys in the first cluster, a wide range of topics, were to improve MOOC efficiency. As we know, MOOC is an updated trend in e-learning, which seemed to be a central node in this cluster. Addressing the benefits and shortfalls of this constantly adapted format was of interest among researchers. Learning analytics, data mining or big data analytics using educational tools and techniques were involved in designed software agents meant to collect data automatically from the learners' environments (Daradoumis et al., 2013). Cross-course differences with a tendency to hoard data to curtail data sharing might be challenging for future researchers within this cluster (Reich, 2015). However, this cluster showed a potential for expansion according to a variety of providers and number of learners, based on the hypothesis that social communication can be presented through learners' social media interaction.

The second cluster contained terms that referred to learners and covered recent topics regarding age and gender & age differences. High education, University and medical education were also clearly visualised. Some high cited examples in this cluster was that Wu, Kao, Wu, and Wei (2019) reviewed that MOOC have been run by both public and private institutes to deliver instructions outside the U.S. This platform was adjusted by focusing on the development of best practices for the learners. Human and Internet linages as the cluster centrality were found, although they seemed to be outdated topics compared to other learners' demographic aspects. In terms of gender & age differences as the update trend in MOOC research, the findings presented how males and females in various cultures shared different outcomes, which included reasons for enrolling, amongst U.S. and non-U.S. users (Crues et al., 2018), intention to use amongst Indians (Govindarajan & Krishnan, 2019) and how faculty members used the MOOC amongst Jordanians (Aljaraideh, 2019).

Although the third cluster was small and disrupted, some key terms, such as 'innovation', 'blended learning' and 'flipped classroom', seemed to be updated. These terms mostly appeared in the health occupation education field between 2018 and 2019, although they were focused on higher education studies, including science, technology, engineering and maths in the earlier years (Lundin, Rensfeldt, Hillman, Lantz-Andersson, & Peterson, 2018). Nevertheless, they showed great potential to be bigger network nodes according to the number of articles in 2020. As we know, flipped classrooms are unlike traditional teacher-centred approaches in that the former truly utilises strategies and technologies that could generate active, collaborative and peer-assisted learning (Akcayir & Akcayir, 2018). Focussing on health education, using flipped classroom in 21 articles related to nursing programs yielded positive academic results, which include satisfaction and engagement (Betihavas, Bridgman, Kornhaber, & Cross, 2016). Realistic assessments are another crucial aspect of providing clinical learning experiences that students find relevant through MOOCs (Tim, 2014). A review of 118 articles in medical education reported the existence of an overall positive perception in the MOOC mode of learning (Chen, Lui, & Martinelli, 2017). Owing to its effectiveness, the sample evidence may explain why the sizes of the nodes might be affected in future trends, particularly in pharmacology and medicine (McLaughlin et al., 2014). Nevertheless, some scholars augured that the workload from flipped classroom implementations for students and instructor can be considered the main challenges.

This review explored an uncompleted small-world property in the MOOC authorship network, as shown in Figure 4. According to the introduction of the small-world network by Watts and Strogatz (1998), the present findings indicated low level clusters associated with other clusters. Moreover, there was no step to pass through the clusters. Although there were fewer ties between the clusters around Alario–Hoyos, C. (green and yellow clusters) and the clusters around Zhang, J. (red, pink and blue clusters), they did not link to each other, thus indicating an absence of small-world networks in the collaboration among authors in this field of research. Some research fields, such as accounting, exhibit small-world properties that enable the exchange of ideas among researchers (Andrikopoulos & Kostaris, 2017). However, the articles in this review confirmed that this effect has not yet happened in this research field since MOOCs was invented.

The tendency has changes with the increasing rate of publications from China and up-coming countries including Taiwan and Malaysia. Additionally, the most cited papers are from the most productive country in general (Ellegaard & Wallin, 2015), thus, it should be noted that the reason why studies from China were cited less compared to the total number of published documents (Figure 6) although China has becomes one of the world leaders after 2013 (Meneses, Cano & Gravan, 2015). It is that publications from Chinese institutes were mostly published in later years (mostly after 2015); hence, they can be expected to receive

higher citations in the future (Chai & Yang, 2014; Li, Chen, & Gong, 2017; Zheng & Yang, 2017). Remarkably, although the numbers of online learners in South Asia and South East Asia were higher than in other regions, the clearly visualized nodes only come from Malaysia, India, Singapore and Indonesia, and overall productivity rates in these regions were low. The publication rates among Middle East and Gulf countries were very low, and they were limited to researchers from United Arab Emirates where presented an absence of coordination to other foreign countries. This estimate could cause for concern with high individual publication numbers in this region.

Future Review Directions

Future review can be designed to complement the current study by addressing our considerations, which have been limited to a single-database analysis. As the data consisted of English articles from Scopus between 2011 and 2020, there may also be a chance of publication bias. This issue might produce some deviations in how we interpreted and discussed the data based on these samples. Thus, future review studies could address this inherent limitation using a sufficiently representative sample comprising articles from other databases and written in other languages.

BIODATA and CONTACT ADDRESSES of AUTHORS

Dr. Chinun BOONROUNGRUT is a lecturer of psychology at department of psychology and guidance, faculty of education, Silpakorn University. Dr. Boonroungrut gained his Ph.D. in developmental and educational psychology. His academic interest areas are Alpha generation, bibliometric network analysis, developmental psychology, open and distance learning behavior, and use of internet in education. He has over than 30 journal articles published in international indexed journals, 1 international book and 2 chapters and other national and international papers submitted to international conferences.

Chinun BOONROUNGRUT
Department of Psychology and Guidance,
Faculty of Education, Silpakorn University.
Address: Silpakorn University, 73000, Nakorn Pathom, Thailand
Phone: +66 820311542
E-mail: boonroungrut_c@su.ac.th

Dr. Wulan Patria SAROINSONG is a lecturer of psychology at department of early childhood education, faculty of education, State University of Surabaya. Dr. Saroinsong gained her Ph.D. in developmental and educational psychology. Her academic interest areas are Alpha generation, bibliometric network analysis, developmental psychology, internet addiction behavior, children' and adolescent's mental health. She has over than 20 journal articles published in national and international indexed journals, 7 national books, 4 property rights (IPR), 3 prototype products and other national and international papers submitted to international conferences.

Wulan Patria SAROINSONG
Department of Early Childhood Education,
Faculty of Education, State University of Surabaya.
Address: Universitas Negeri Surabaya, 62013, Surabaya, East java, Indonesia
Phone: +62 081229010188
E-mail: wulansaroinsong@unesa.ac.id

One KIM is a lecturer of foreign language at Zaehoon Language Institute. Mr. Kim gained his M. A. in foreign language studies. He has multi-cultural experiences in teaching language, online and offline, in various Asian countries, including Korea, China and Thailand. His academic interest areas are online language learning, student' autonomy and language studies in MOOCs. He currently has 10 journal articles published in international indexed journals.

One KIM
Zaehoon Language Institute, Bangkok, Thailand
Address: Samyan Mitrtown, 10330, Bangkok, Thailand
Phone: +66 648218205
E-mail: fitgato@gmail.com

REFERENCES

Ahmad M.A., Hussin A.R.C., Yusof A.F. (2020) *Motivations of Teaching in Massive Open Online Course: Review of the Literature.* In: Saeed F., Mohammed F., Gazem N. (eds) Emerging Trends in Intelligent Computing and Informatics. IRICT 2019. Advances in Intelligent Systems and Computing, vol 1073. Springer, Cham

Akcayir, G., & Akcayir, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education, 126*, 334-345.

Aljaraideh, Y. (2019). Massive open online learning (MOOC) benefits and challenges: A case study in Jordanian context. *International Journal of Instruction, 12*(4), 65-78.

Andrikopoulos, A., & Kostaris, K. (2017). Collaboration networks in accounting research. *Journal of International Accounting, Auditing and Taxation, 28*, 1-9.

Beller, E. M., Glasziou, P. P., Altman, D. G., Hopewell, S., Bastian, H., Chalmers, I., ... & PRISMA for Abstracts Group. (2013). PRISMA for abstracts: reporting systematic reviews in journal and conference abstracts. *PLoS Med, 10*(4), 1-14.

Betihavas, V., Bridgman, H., Kornhaber, R., & Cross, M. (2016). The evidence for 'flipping out': A systematic review of the flipped classroom in nursing education. *Nurse education today, 38*, 15-21.

Boga, S., & McGreal, R. (2014). Introducing MOOCs to Africa: New economy skills for Africa program. Retrieved March 27, 2020, from Athabasca University research database.

Bonk, C.J., Lee, M.M., Reeves, T.C. & Reynolds, T.H. (2015). *Revisiting "MOOCs and Open Education Around the World".* Presented at E-Learn: World Conference on E-Learning. 2015. Retrieved June 28, 2020 from https://www.learntechlib.org/primary/p/152279/

Boonroungrut, C., & Saroinsong, W. P. (2020). *The analysis of public interest in MOOCs using Google Trend®: An evidence from Thailand during 2018 to 2020.* Paper presented at the The 4th International Conference on Education Innovation, Surabaya, Indonesia.

Chai, Y., & Yang, L. (2014). *A literature review of MOOC.* Paper presented at the 3rd International Conference on Science and Social Research (ICSSR 2014), Tianjin, P.R. China. Retrieved from https://www.atlantis-press.com/proceedings/icssr-14/11848

Chen, F., Lui, A. M., & Martinelli, S. M. (2017). A systematic review of the effectiveness of flipped classrooms in medical education. *Medical education, 51*(6), 585-597.

Chiu MH. (2016) *Introduction.* In: Chiu MH. (eds) Science Education Research and Practice in Asia. Springer, Singapore.

Crues, R., Henricks, G. M., Perry, M., Bhat, S., Anderson, C. J., Shaik, N., & Angrave, L. (2018). How do gender, learning goals, and forum participation predict persistence in a computer science MOOC? *ACM Transactions on Computing Education, 18*(4), 1-18.

Daradoumis, T., Bassi, R., Xhafa, F., & Caballe, S. (2013). *A review on massive e-learning (MOOC) design, delivery and assessment.* Paper presented at the 2013 eighth international conference on P2P, parallel, grid, cloud and internet computing, Compiegne, France.

De Barba, P. G., Malekian, D., Oliveira, E. A., Bailey, J., Ryan, T., & Kennedy, G. (2020). The importance and meaning of session behaviour in a MOOC. *Computers & Education, 146*, 1-18.

Deng, R., & Benckendorff, P. (2017). A contemporary review of research methods adopted to understand students' and instructors' use of massive open online courses (MOOCs). *International Journal of Information and Education Technology, 7*(8), 601-607.

Deng R., Benckendorff P., Gannaway D. (2017) *Understanding Learning and Teaching in MOOCs from the Perspectives of Students and Instructors: A Review of Literature from 2014 to 2016.* In: Delgado Kloos C., Jermann P., Perez-Sanagustin M., Seaton D., White S. (eds) Digital Education: Out to the World and Back to the Campus. EMOOCs 2017. Lecture Notes in Computer Science, vol 10254. Springer, Cham

Downes, S. (2008). *MOOC and mookies: The connectivism & connective knowledge online course.* Paper presented at the Seminar presentation delivered to eFest, Auckland, New Zealand.

Ebben, M., & Murphy, J. S. (2014). Unpacking MOOC scholarly discourse: A review of nascent MOOC scholarship. *Learning, Media and Technology, 39*(3), 328-345.

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact?. *Scientometrics, 105*(3), 1809-1831.

Gasevic, D., Kovanovic, V., Joksimovic, S., & Siemens, G. (2014). Where is research on massive open online courses headed? A data analysis of the MOOC Research Initiative. *International Review of Research in Open and Distributed Learning, 15*(5), 134-176.

Govindarajan, M. P., & Krishnan, A. (2019). A study on moderating effect of gender, and experience on massive open online courses (MOOCs) technology adoption by extending the Utaut model with reference to student MOOC users. *Journal of the Gujarat Research Society, 21*(3), 350-358.

Griesbaum, J. (2014). Students as teachers in MOOCs? The double gain of MOOCs as an in-class teaching method Experiences from a student-made MOOC "online data privacy". *International Journal of Information and Education Technology, 4*(1), 29-34.

Guajardo Leal, B. E., Navarro-Corona, C., & Valenzuela Gonzalez, J. R. (2019). Systematic mapping study of academic engagement in MOOC. *International Review of Research in Open and Distributed Learning, 20*(2), 112-139.

Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational Research Review, 12*, 45-58.

Hudson, L., Wolff, A., Gooch, D., Van Der Linden, J., Kortuem, G., Petre, M.,... O'Connor-Gotra, S. (2019). Supporting urban change: Using a MOOC to facilitate attitudinal learning and participation in smart cities. *Computers & Education, 129*, 37-47.

Jordan, K. (2014). Initial trends in enrolment and completion of massive open online courses. *International Review of Research in Open and Distributed Learning, 15*(1), 133-160.

Li X., Chen Y., Gong X. (2017) MOOCs in China: A Review of Literature, 2012–2016. In: Ma W., Chan CK., Tong K., Fung H., Fong C. (eds) New Ecology for Education — Communication X Learning. Springer, Singapore

Liyanagunawardena, T. R., Adams, A. A., & Williams, S. A. (2013). MOOCs: A systematic study of the published literature 2008-2012. *The International Review of Research in Open and Distributed Learning, 14*(3), 202-227.

Lundin, M., Rensfeldt, A. B., Hillman, T., Lantz-Andersson, A., & Peterson, L. (2018). Higher education dominance and siloed knowledge: A systematic review of flipped classroom research. *International Journal of Educational Technology in Higher Education, 15*(1), 1-30.

McAuley, A., Stewart, B., Siemens, G., & Cormier, D. (2010). The MOOC model for digital practice. Retrived June 29, 2020, from the University of Prince Edward research database (unpublished work).

McLaughlin, J. E., Roth, M. T., Glatt, D. M., Gharkholonarehe, N., Davidson, C. A., Griffin, L. M.,… Mumper, R. J. (2014). The flipped classroom: A course redesign to foster learning and engagement in a health professions school. *Academic Medicine, 89*(2), 236-243.

Meneses, E. L., Cano, E. V., & Gravan, P. R. (2015). Analysis and implications of the impact of MOOC movement in the scientific community: JCR and Scopus (2010-13). *Comunicar. Media Education Research Journal*, *23*(1), 5-12.

Reich, J. (2015). Rebooting MOOC research. *Science, 347*(6217), 34-35.

Rincon-Flores, E. G., Montoya, M. S. R., & Mena, J. (2019). *Engaging MOOC through gamification: Systematic mapping review.* Paper presented at the 7th International Conference on Technological Ecosystems for Enhancing Multiculturality, Leon, Spain.

Robertshaw, D., & Cross, A. (2016). *MOOC as a platform for social learning, research and social change in dementia.* Paper presented at the European Stakeholder Summit on experiences and best practices in and around MOOCs (EMOOCS 2016), Graz, Austria.

Robertshaw, D., & Kotera, Y. (2020). Changing attitudes with a MOOC on dementia. *European Journal of Open, Distance and E-learning, 22*(2), 27-40.

Shah, D. (2019). By The Numbers: MOOCS in 2019. Retrieved February, 2020, from https://www. classcentral.com/report/mooc-stats-2019

Si, C. (2020). *Analysis and application of computer modeling for MOOC.* Paper presented at the International Conference on Cyber Security Intelligence and Analytics, Haikou, P.R. China.

Tim, J. (2014). Flipping the Classroom. *Teaching and Learning in Nursing, 9*, 43-46.

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *scientometrics*, *84*(2), 523-538.

Veletsianos, G., & Shepherdson, P. (2016). A systematic analysis and synthesis of the empirical MOOC literature published in 2013–2015. *International Review of Research in Open and Distributed Learning, 17*(2), 198-221.

Watts, D. J., & Strogatz, S. H. (1998). Collective dynamics of 'small-world' networks. *Nature, 393*, 440-442.

Wamba, S. F., & Akter, S. (2015, June). Big data analytics for supply chain management: A literature review and research agenda. In *Workshop on Enterprise and Organizational Modeling and Simulation* (pp. 61-72). Springer, Cham.

Wu, W., Kao, H., Wu, S., & Wei, C. (2019). Development and evaluation of affective domain using student's feedback in entrepreneurial MOOC Courses. *Frontiers in psychology, 10*, 1-9.

Yuan, L., & Powell, S. (2013). MOOCs and open education: Implications for higher education. Retrieved June 29, 2020, from https://e-space.mmu.ac.uk/619735/1/MOOCs-and-Open-Education.pdf

Zheng, Y., & Yang, R.-Y. (2017). The rise of MOOCs: The literature review of research progress and hot spots of MOOCs education in mainland China. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(9), 6165-6174.

Zhu, M., Sari, A., & Lee, M. M. (2018). A systematic review of research methods and topics of the empirical MOOC literature (2014–2016). *The Internet and Higher Education, 37*, 31-39.