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Trends and Future Prospects in MOOC Researches: A Systematic Literature Review 2013–2020

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Abstract

Advent of internet has a revolutionary impact on every sector of economy and so is with the education sector, which has witnessed the evolution of online education through scalable educational technology, namely, Massive Open Online Courses (MOOCs). The purpose of this paper is to summarize the pool of available knowledge related to MOOCs in the scholarly literature, published during the period 2013–2020. One hundred and two available published studies in peer reviewed journals & conferences searched in major academic databases have been reviewed and presented in the systematic literature review. The findings have been divided under the various research themes of MOOCs including geographical contribution of MOOC studies, citation trends, prominent research themes, theoretical frameworks and methodological rigor in the existing scholarly works. The results demonstrate that most empirical research were conducted by the researchers having affiliation to institutions based out of United States followed by institutions in the developing economies of China and India. The most focused area of research in MOOCs is on MOOC adoption. Limited research has happened on poor MOOC completion status, the instructor-related topics and on democratization of MOOC. Thrust areas of MOOC researches and future research directions are also discussed.

Keywords: Massive Online Open Course (MOOC), e-learning, online education, educational technology, technology adoption, literature review

INTRODUCTION

Open and online education is regarded as disruptive innovation, which will fuel growth in the education sector and will transform the landscape of secondary and tertiary education systems. With regard to this, MOOCs are considered to be an excellent medium for promoting lifelong learning that is one of the important objectives of Sustainable Development Goals (SDG4) for Quality Education listed by United Nations and to be achieved by all the member nations by 2030. As MOOC courses are offered free of cost to anybody and everybody staying in any part of the world anytime, it provides access to higher education and beyond for people who cannot afford a formal education and are disadvantaged. In this regard, MOOCs may be considered as contributing to social inclusion by democratization of higher education (The United Nations Educational, Scientific and Cultural Organization (UNESCO), 2016). Digitalization is one of the most talked about and promising development in the area of education and MOOC is featured in "Innovation Pedagogy Report 2014" by Open University as among TOP 10 pedagogies that might transform education to an

Table 1. Summary of prominent previous MOOC literature reviews

Author	Year	Theme	Timeline Covered
Liyanagunawardena et al.	2013	Concept, case studies, educational theory	2008-2012
Hew and Cheung	2014	Motivations and challenges of using MOOCs	Till July 2013
Gasevic et al.	2014	Student engagement and learning success	2008-2014
Ebben and Murphy	2014	Conceptualizes themes in MOOC scholarship	2009-2013
Raffaghelli et al.	2015	Methodological approaches in MOOC research	2008-2014
Saadatdoost et al.	2015	MOOCs research from IS perspective	2013-2014
Veletsianos and Shepherdson	2016	Better scholarly understanding of MOOCs	2013-2015
Bozkurt et al.	2017	Trends and patterns in research on MOOCs	2008-2015
Joksimovic et al.	2018	Approaches to model learning in MOOCs	2012-2015
Zhu Et al.	2020	Understanding of the MOOC phenomenon	2009-2019

unprecedented levels. MOOC has garnered immense public attention in the last couple of years as a new technology enhanced learning (TEL) medium in higher education (Wosnitza & Yousef, 2014).

MOOCs have brought world-class education on the doorsteps completely shaking up the higher education sector with the potential to disrupt the traditional brick-and-mortar universities model. Traversing this period of infancy to growth, MOOC has gone through crest and trough, from being eulogized as the disruptive educational technology (Yuan & Powell, 2013) which will make education affordable and hence promote social inclusion through a subject of general public debate and government interest (Kovanović et al., 2015) to being written off by academic critiques of MOOC concepts (Baker & Passmore, 2016).

RESEARCH SIGNIFICANCE

Many researchers in the past have studied and synthesized MOOC literature (Refer **Table 1**). All the literature reviews have focused on range of topics concerning MOOC. Though all the referred literature reviews have adopted different approach in terms of their interest and pool of sampled articles, their work has added to the existing body of knowledge the gist of prevailing practices in the MOOC world from every stakeholder's perspective and the experts writing on this domain.

With MOOC phenomenon barely a decade old and relatively a new field to explore by the researchers, an updated systematic review of the empirical research literature on MOOC is needed on account of: (a) MOOC users grew from 2 million in 2012 to 180 million in 2020, and number of MOOC courses offered grew from 250 in 2012 to 16300 in 2020 (Class Central, 2020); (b) MOOCs have inspired millions of people during COVID-19 to explore various study options sitting at home; (c) The impact and reach of MOOCs in developing countries (Liyanagunawardena et al., 2013); (d) MOOC research is increasingly diverse and evolving (Veletsianos & Shepherdson, 2015) ; (e) Better clarity on the research methods used in MOOC research is needed (Raffaghelli et al., 2015); (f) Evaluating access, quality, and equity in online learning to bridge the digital and social divide (Tobias and Reich, 2020); (g) MOOCs contribution to student equity and social inclusion (Lambert, 2020) and (h) MOOCs as a digital learning strategy of education for sustainable development (Gómez-Zermeño, 2020). The pandemic affected year 2020 has taught people as what MOOC is. MOOC web traffic of Coursera and edX which are the two leading MOOC service provider rose to 74.6M and 34.9M respectively during the peak month of COVID-19 pandemic in April 2020 (Class Central, 2020).

Contemplating current trends in the world, this study is both timely and significant because of various reasons. Discussions around the digital mode of learning and its pros and cons have been the most talked topic among education fraternity (Marinoni, 2020) with all-conceding to the fact that blended learning which is a combination of virtual and on campus learning is the way forward for educational institutions (www.universityworldnews.com, 2020). With educational technology continuously evolving (Zhu et al., 2020), a detailed analysis of MOOC literature for the period of 2013 to 2020 can assist MOOC providers, governments, educators, and policy makers to draw strategies for the democratisation of education to bridge social divide on the lines of education more so when the need of online education for everyone has been necessitated by COVID-19. This research can also help MOOC researchers know the existing gaps in present

research, latest updates and themes in the world of MOOCs, burgeoning role of technology viz. use of data collection and analytical tools and software in research methodology and future directions to dwell on MOOC research and add to the body of knowledge.

The objective of this study, thus, is to do systematic review of the available empirical researches on MOOCs from 2013, the year MOOC movement started gaining traction to 2020, when MOOC became the talking point for every student and his or her parents owning to COVID-19 The contemplated time span of eight years is adequate for the fast evolving educational technology field to progress, mature and provide adequate data to find trends and patterns. The research thus addresses five research questions that we identified in our examination of the current scholarly literature. These questions are listed in the section below.

RESEARCH QUESTIONS

The research questions to support the scholars, practitioners, and policy-makers in curating further researches and decision-making are as under –

RQ1. How empirical MOOC research is geographically distributed?

RQ2. What are the research themes and sub-themes in MOOC researches?

RQ3. What are the research methodologies used in MOOC researches?

RQ4. What is the citation trends of MOOC researches and influential MOOC authors cited most frequently?

RQ5. Which are the most referred theoretical frameworks and models in MOOCs?

RESEARCH METHODOLOGY

This review attempts to analyse and organize the pool of available literature in the field of MOOC in last seven years. Existing MOOC researches, published from 2013 – 2020, form the foundation of searching published quantitative and/or qualitative research work done in this context. Within the preview of selected academic databases (Scopus, Web of Science, EBSCO, Google Scholar, Emerald, Elsevier, Taylor & Francis, and Sage), the researchers used various keywords such as "Massive Online Open Course", "MOOC", e-learning, Online Education, Educational technology, Technology Adoption, Literature Review to find important studies. We restricted our search to empirical studies published and presented in prominent peer-reviewed journals and conferences proceedings respectively. All review papers, unpublished theses and dissertations and book chapters were not included for the review. Articles published in English language only were included for the review. Our initial search generated 296 articles and conference papers (Refer **Figure 1**). Next based on the inclusion criteria: Choosing article based on empirical approach, abstract quality, article citation, cite score of the journal, conference and relevance to study objectives, 187 articles were selected and in the last after applying the exclusion criteria of removing the repeated articles, articles not available in full text and articles not related with MOOCs and online education, ninety two relevant articles and ten conference papers, published in fifty four different journals and five conferences respectively, were zeroed down for the systematic review and analysis (Refer **Appendices**).

Of the total 102 articles reviewed, 37 articles were published from 2013–2016 and the rest 65 articles were published from 2017 to 2020 which is indicative of the increasing interest of researchers on MOOCs as an area of study.

We searched, selected, analysed, and reviewed relevant empirical research articles from the chosen and reputed electronic databases and constructed the review framework using the manual content analysis in finding the key topics, themes, geographical distribution, research methodology, citation trend, theoretical framework of the articles reviewed, on account of limited access to automated content analysis tool.
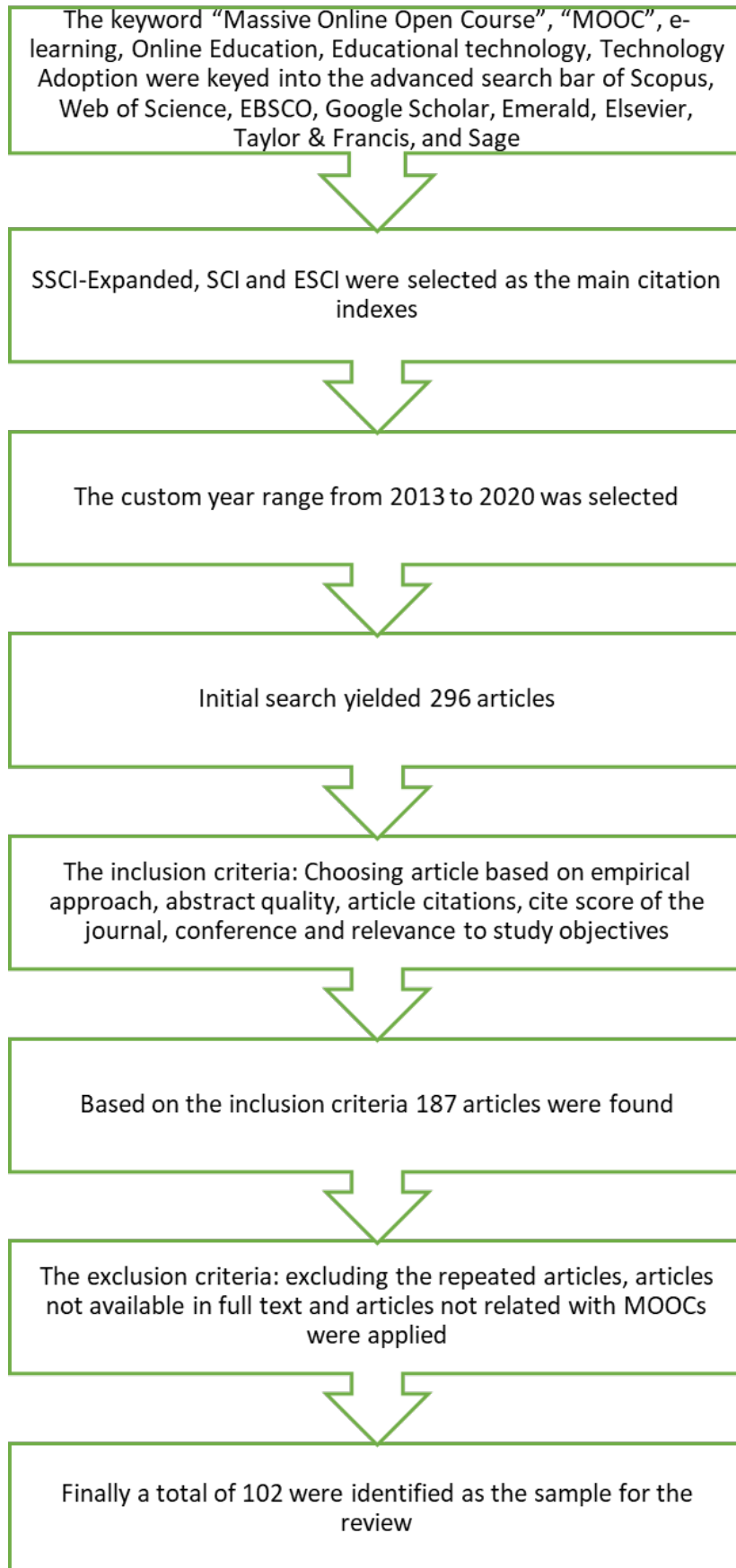
The keyword "Massive Online Open Course", "MOOC", e-learning, Online Education, Educational technology, Technology Adoption were keyed into the advanced search bar of Scopus, Web of Science, EBSCO, Google Scholar, Emerald, Elsevier, Taylor & Francis, and Sage

SSCI-Expanded, SCI and ESCI were selected as the main citation indexes

The custom year range from 2013 to 2020 was selected

Initial search yielded 296 articles

The inclusion criteria: Choosing article based on empirical approach, abstract quality, article citations, cite score of the journal, conference and relevance to study objectives

Based on the inclusion criteria 187 articles were found

The exclusion criteria: excluding the repeated articles, articles not available in full text and articles not related with MOOCs were applied

Finally a total of 102 were identified as the sample for the review

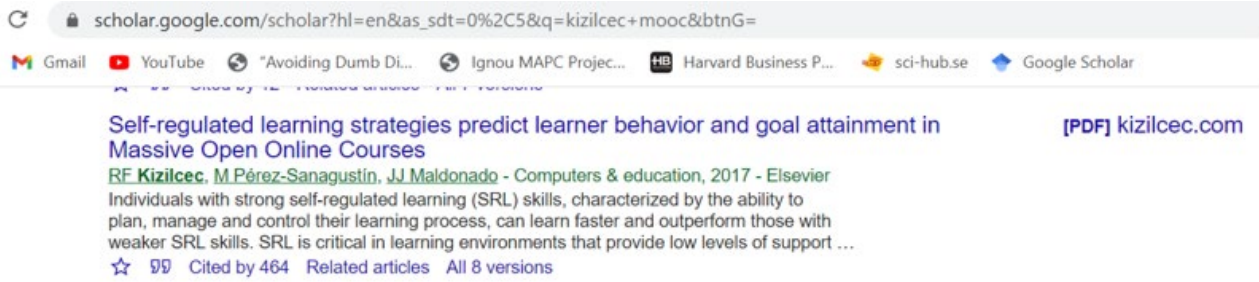**Figure 1.** Article Selection Process of the study

Figure 2. Google citation count

To ensure the trustworthiness and validity of the research, we did the article selection independent of each other and later, cross-checked the data, to chaff out discrepancies so as to reach consensus on analyses. Finally, the identified articles from 2013 to 2020 was 102. The inter-rater agreement to check the reliability of search was calculated dividing total number of codes with agreement by the total number of codes. The inter-rater agreement across all items came at 84.95%. To reconcile the differences, we discussed and resolved the differences to have uniform code assignment across all the items. The data collected carried various subject of study such as the journal name, publisher, database, citation trend, year of publication, research methodology, theme and context of study, and theoretical framework used in the study. Other relevant and important data collected included author name and institutional affiliation, institution geographical location, and the year of study.

DATA ANALYSIS

For Research Question 1 (RQ1), to determine the geographical spread of MOOC research across countries, we coded the affiliations of first authors from our sampled corpus (n=102) by the country in which their institution was located. To answer RQ2, to determine research themes and sub themes in MOOC studies, we identified the factors responsible for subject's behaviour towards MOOCs. Research themes namely MOOC Adoption, MOOC Engagement and Continuance, MOOC Completion, MOOC Experience and Appraisal were derived from the research title, research objectives and research subject's behaviour towards MOOCs and research sub themes were identified basis coding categories discussed in the MOOC review paper by Veletsianos and Shepherdson (2016). We restricted the sub themes to four instead of five and removed the sub theme of "others" as all our articles fit into the following four sub themes: Learner-focused; Instructor-focused; Design-focused; and Context and impact focused. To answer RQ3, to determine research method, Creswell (2003) study was used as the reference point for coding the research types such as quantitative research, qualitative research, and mixed-methods. For creating coding criteria for data collection method or research instruments, study by Tashakkori and Teddlie (2003) was kept as the reference point for the identification of data collection namely, surveys, interviews, focus group, observations and tests, we also added discussion forum, platform database, and learning analytics as data collection methods basis articles reviewed. For data analysis methods, we coded data analysis tools used in the sampled articles. To answer RQ4 to determine year wise citation trend and most cited work we checked every article in our sampled corpus on Google Scholar to note the citation count (Refer **Figure 2**).

To answer RQ5, to determine the theoretical framework used by the researchers to base their empirical research on, we coded the theoretical frameworks used in our sampled corpus. Data was tabulated using descriptive statistics.

RESULTS

The results section is segregated into five conceptualised questions. Each question highlights the work done in the area of MOOC and the knowledge in line with the objective of this study.
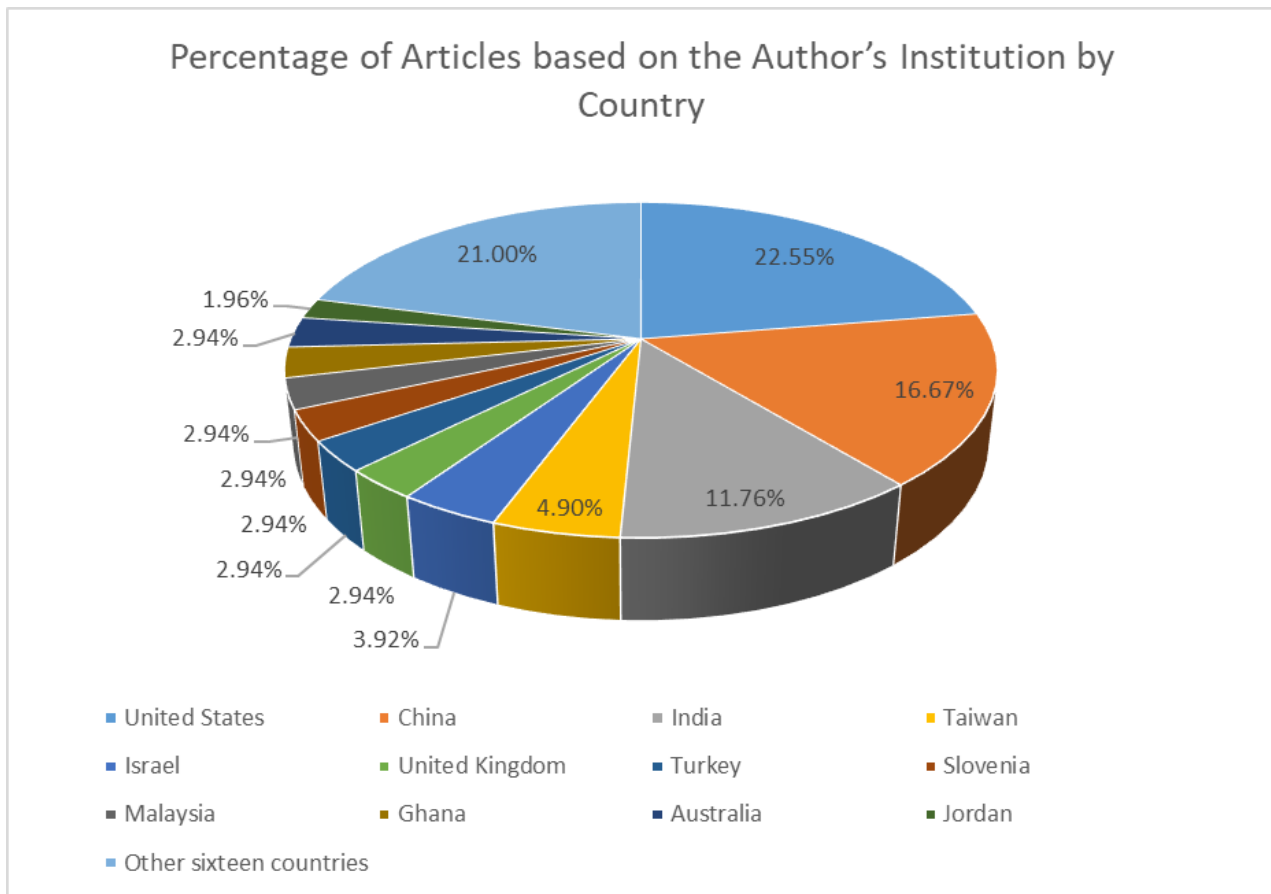
Figure 3. Articles based on the Author's Institution by Country

RQ1. How Empirical MOOC Research is Geographically Distributed?

This question was asked to understand whether the empirical research on MOOCs are country specific or is it a universal phenomenon, one hundred and two sampled articles are from twenty-eight countries. **Figure 3** suggests that eighty one research papers on MOOCs are published by the authors working in the institutions of twelve countries namely USA (23) followed by China (17), India (12), Taiwan (5), Israel (4), Australia (3), United Kingdom (3), Turkey (3), Slovenia (3), Ghana (3), Malaysia (3), and Jordan (2). Remaining twenty-one papers are published by the authors belonging to institutions in sixteen different countries.

RQ2. What are the Research Themes and Sub-themes in MOOC Researches?

Majority of the sampled articles were themed on MOOC adoption at 57.84% followed by MOOC Engagement & Continuance at 17.65%, MOOC Experience and Appraisal at 16.67%, and MOOC completion at 7.84%. Sub themes are explained as -

Learner-focused: Majority of the empirical literature on MOOCs focused on learners and learning process. 63.73% of the articles were related to learners and ranged from students adoption behaviour (Al-Adwan, 2020; Sun et al., 2018), instructor influence on students (Aharony & Bar-Ilan, 2017), students perception about themselves regarding their existing knowledge and proficiency in language while adopting MOOCs (Al-Adwan & Khdour, 2020; Zhou, 2016), role of self-regulated learning in MOOC achievement (Min & Nasir, 2020) and influence of functional Internet access on actual MOOC usage (Fianu & Blewett, 2020).

Context and impact: Research related to the context and impact (both social and educational) of MOOCs was the focus area in 13.73% of the sampled articles. This sub-theme included research into perceptions of MOOCs (Annabi & Muller, 2016; Pillai & Sivathanu, 2019; Zutshi et al., 2013), their scope and advantage as

Table 2. Frequency of article theme and sub theme wise

Theme	Sub Theme	Total Articles	% of Articles
MOOC Adoption	Context and Impact	9	8.82%
	Design Focussed	5	4.90%
	Instructor Focussed	5	4.90%
	Learner Focussed	40	39.22%
MOOC Adoption Total		59	57.84%
MOOC Completion	Design Focussed	1	0.98%
	Learner Focussed	7	6.86%
MOOC Completion Total		8	7.84%
MOOC Engagement & Continuance	Context and Impact	1	0.98%
	Design Focussed	3	2.94%
	Instructor Focussed	1	0.98%
	Learner Focussed	12	11.76%
MOOC Engagement & Continuance Total		17	16.67%
MOOC Experience and Appraisal	Context and Impact	4	3.92%
	Design Focussed	5	4.90%
	Instructor Focussed	3	2.94%
	Learner Focussed	6	5.88%
MOOC Experience and Appraisal Total		18	17.65%
Grand Total		102	100.00%

Table 3. Research Method Adopted

Research Method	Number of Articles	% of Articles
Quantitative Research	72	70.00%
Qualitative Research	16	15.69%
Mixed Method	14	13.73%
Grand Total	102	100.00%

an educational medium (Larionova, 2018; Stohr et al., 2019), and their socio-economic impact (Ma & Lee, 2017; Stich & Reeves, 2016).

Design-focused: 13.73% of the sampled articles in MOOC literature had a focus on areas related to MOOC design, creation, and implementation, which we sub-themed as design-focused. This sub-theme was related to the designing and implementing of MOOC for successful engagement and completion of course (Hone & Said, 2016; Oudeweetering & Agirdag, 2018), the description of virtual learning environments (Albelbisi, 2019), and the reports of novel technological and pedagogical aids to teaching in MOOCs (Aparicio et al., 2018).

Instructor-focused: Of the selected corpus of MOOC literature, 8.82% of the articles focused on topics related to the instructors and their teaching experiences. Papers under this sub-theme focused on instructors' acceptance, role, perception, and experiences with MOOCs (Evans & Myrick, 2015; Stackhouse, 2020; Tseng, 2019), (Refer **Table 2**).

RQ3. What are the Research Methodologies Used in MOOC Researches?

Research Method: Based on the analyses of one hundred two articles, we found that, 72 research papers (70%) are quantitative in nature, 16 research papers (15.69%) are qualitative in nature, and the remaining 14 research papers (13.73%) are mixed method in research type (Refer **Table 3**).

Sampling Method: Overall, 96 (94.12%) articles used non-probability sampling as a sampling method with remaining 6 (5.88%) using probability sampling (Refer **Table 4**).

Table 4. Sampling Method

Sampling Method Used	Number of Articles	% of Articles
Convenience Sampling	67	65.69%
Purposive Sampling	24	23.53%
Snowball Sampling	5	4.90%
Random Sampling	3	2.94%
Stratified Random Sampling	3	2.94%
Grand Total	102	100%

Table 5. Use of Research Instrument

Research Instrument	Number of Articles	% of Articles
Online Survey	59	57.84%
Field Survey	16	15.69%
Online and Field Survey	11	10.78%
Focus Group	4	3.92%
Platform Surveys and Web Log Discussion Data	4	3.92%
Interview	3	2.94%
Data Mining Technique	1	0.98%
Discovery Website-Coursetalk, Course Reviews	1	0.98%
Entrance Survey and Interview	1	0.98%
Google Blog Search	1	0.98%
Online Survey and Interview	1	0.98%
Grand Total	102	100.00%

Research Instrument: Online survey emerged as a single most used data collection method by the researchers at 57.84% of articles followed by Field Survey at 15.69% and the combined usage of Online and Field Survey at 10.78% (Refer **Table 5**).

Data Analysis Method: It was found that most widely used data analysis method in empirical researches on MOOCs was of PLS-SEM (partial least squares-structural equation modelling) at 26.47% of papers, followed by AMOS-SEM at 15.69%, combined usage of Content Analysis and Descriptive Statistics at 12.75%, Descriptive Statistics at 8.82%, Logistic Regression at 4.90%, Thematic Analysis and Descriptive Statistics at 4.90%, Descriptive & Inferential Statistics at 2.94%, Hierarchical Regression Analysis at 2.94%, Multiple Regression Analysis at 2.94%, Regression Analysis at 1.96% and rest of the data analysis methods such as AMOS-SEM & Neural Network, Analytic Hierarchy Process (AHP), ANOVA & Constant Comparative Method, Clustering Technique (K means Algorithm), Constant Comparative Method, Content Analysis and Hierarchical regression, Content Analysis and Multiple Regression Analysis, Descriptive, Inferential Statistics and Grounded Theory, General Linear Progression Model, Grounded theory and Netnography at 0.98% each (Refer **Table 6**).

Table 6. Top twenty data analysis methods used by MOOC researchers

Data Analysis Method	Total Articles	% of Articles
PLS-SEM	27	26.47%
AMOS-SEM	16	15.69%
Content Analysis and Descriptive Statistics	13	12.75%
Descriptive Statistics	9	8.82%
Logistic Regression	5	4.90%
Thematic Analysis and Descriptive Statistics	5	4.90%
Descriptive and Inferential Statistics	3	2.94%
Hierarchical Regression	3	2.94%
Multiple Regression Analysis	3	2.94%
Regression Analysis	2	1.96%
AMOS-SEM & Neural Network	1	0.98%
Analytic Hierarchy Process (AHP)	1	0.98%
ANOVA & Constant Comparative Method	1	0.98%
Clustering Technique (K means Algorithm)	1	0.98%
Constant Comparative Method	1	0.98%
Content Analysis and Hierarchical regression	1	0.98%
Content Analysis and Multiple Regression Analysis	1	0.98%
Descriptive Statistics, Inferential Statistics and Grounded Theory	1	0.98%
General Linear Progression Model	1	0.98%
Grounded theory and Netnography	1	0.98%

Table 7. MOOC scholarship and citation trend by year

Year	No. of articles	Cumulative citations	Average citation/paper
2013	7	1021	146
2014	5	1176	235
2015	14	1515	108
2016	11	1514	138
2017	18	1418	79
2018	18	602	33
2019	15	248	17
2020	14	112	8

RQ4. What is the Citation Trends of MOOC Researches?

Of the sampled literature, major number (average) of citations were collected by articles written in the years of 2015, 2016 and 2017 (Refer **Table 7**).

Most cited research work is listed in **Table 8**.

Table 8. Most cited work

S.no.	Author	Year	Journal Name	Citation
1	Kizilcec et al.	2016	Computers & Education	464
2	Khaled M. Alraimi et al.	2014	Computers & Education	452
3	Hone and Said	2016	Computers & Education	449
4	Wu and Chen	2017	Computers in Human Behavior	415
5	Bruff et al.	2013	Journal of Online Learning and Teaching	381
6	Barak et al.	2015	Computers & Education	302
7	Raman et al.	2013	International Education Studies	271
8	Yousef and Wosnitza, Germany	2014	IEEE Xplore Digital Library	271
9	Attuquayefio and Addo	2014	The International Journal of Education and Development using Information and Communication Technology	212
10	El-Masri and Tarhini	2017	Educational Technology Research and Development	199
11	Zhou	2015	Computers & Education	190
12	Zhenghao et al.	2015	Harvard Business Review	188
13	Pursel et al.	2016	Journal of Computer Assisted Learning	184
14	Shapiro et al.	2017	Computers & Education	183
15	Mitja Decman	2015	Computers in Human Behavior	163

Table 9. Top twenty theories and models used by the researchers as theoretical framework

S.no.	Theory and Model	No. of Articles	% of Articles
1	Technology Acceptance Model (TAM)	11	18.03%
2	Unified theory of acceptance and use of technology (UTAUT)	11	18.03%
3	Unified theory of acceptance and use of technology 2 (UTAUT2)	4	6.56%
4	Diffusion of Innovation	3	4.92%
5	Big Five Theory	2	3.28%
6	3P Model	1	1.64%
7	Community of Inquiry (CoI) Framework	1	1.64%
8	Decomposed Theory of Planned Behavior (DTPB)	1	1.64%
9	DeLone and McLean Information System model	1	1.64%
10	DeLone and McLean Information System model AND Gamification Theory	1	1.64%
11	Information systems continuance expectation-confirmation model	1	1.64%
12	Innovation Resistance Theory	1	1.64%
13	Innovation Theory	1	1.64%
14	Institutional Theory	1	1.64%
15	Institutional Theory and TAM	1	1.64%
16	Media Richness Theory & Technology Acceptance Model (TAM)	1	1.64%
17	Pintrich Model of SRL	1	1.64%
18	Resource & Appropriation Theory & Second Level Digital Divide	1	1.64%
19	Self Determination Theory	1	1.64%
20	Self-Directed Learning (SDL)	1	1.64%

RQ5. Which are the Most Referred Theoretical Frameworks and Models in MOOCs?

Of the sampled literature, we found that forty one out of one hundred two researchers did not use any framework or model to explain MOOC phenomenon. Remaining researchers used the existing theoretical frameworks or models to explain the MOOC phenomenon either by extending the existing theory or by testing and validating the existing theories within their respective sampling universe, frame and unit of study (Refer **Table 9**).

The most widely used theoretical model in the sampled literature is Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) at 18.03% each followed UTAUT2 and Diffusion of Innovation at 6.56% and 4.92% respectively. TAM was used alone in eleven papers and in another six as an integrated model with another theories and models to explain MOOC or to say the technology adoption phenomenon.

DISCUSSION

Emergence of China and India

Referring to the sampled literature, we examined the geographic distribution, research publication source, citations, research methodology, research themes and sub-themes, theoretical frameworks and models of the 2013–2020 empirical research articles on MOOCs. Results highlighted that 50.98% of the articles have been published by authors having affiliations to institutions based out of United States, China and India. While United States (22.55%) remain the top publisher of articles as mentioned in earlier studies (Veletsianos & Shepherdson, 2016; Zhu et al, 2020), our study revealed the emergence of developing economies of Asia namely, China (16.67%) and India (11.76%) occupying second and third slot in terms of research paper publication, which is quite encouraging and showing growing acceptance of MOOCs in these two emerging economies of the world. There were research articles by authors having affiliations to institutions located in countries viz. Taiwan, Israel, Turkey, Chile, Egypt, Russia, Jamaica, Mongolia, Jordan, U.A.E., Malaysia, Saudi Arabia, Hong Kong, Indonesia and Thailand suggestive of MOOCs awareness spreading across the world and MOOC becoming area of research interest for scholars and academicians.

Over Dependence on Quantitative Techniques

Research Method: Study revealed that researchers chose to apply quantitative research method to conduct research, constituting 70% of total research papers followed by qualitative research at 15.69% and mixed method at 13.73% and these data substantiate Veletsianos and Shepherdson's (2016) findings about research methodological diversity in MOOCs research.

Sampling Design: Most widely used sampling method was non-probability sampling method (94.12%) with rest following probability sampling. Convenience Sampling was the most preferred non-probability sampling method at 65.69%. Reason cited was not adequate users of MOOCs available in their sampling frame to carry out probability sampling (Alraimi et al., 2014; Shapiro et al., 2017). Non-probability sampling method used by the majority of researchers may skew sample representations and therefore the generalizability of research findings (Stich & Reeves, 2016) hence a strong need to apply probability sampling method to collect data (Deng et al., 2020; Mulik et al. 2018) to generalize research findings.

Research Instrument: Online survey emerged as a single most used data collection method by the researchers at 57.84% of articles followed by Field Survey at 15.69% and Online and Field Survey at 10.78%. Interesting to note is the increasing use of the Platform Surveys & Web Log Discussion Data, Discovery website-coursetalk and Data mining techniques by the researchers which is suggestive of the increasing use of e-learning resources, internet in education, and the ready access to availability of student data in large data repositories. This information is utilized to understand the students learning pattern and other important behavioural online c (Romero & Ventura, 2013).

Data Analysis Technique: PLS-SEM (partial least squares-structural equation modelling) at 26.47% was the most used data analysis technique by researchers followed by AMOS-SEM and the combination of content analysis and descriptive statistics at 15.69% and 12.75% respectively. Structural Equation Modelling (SEM) is mostly used to test the proposed model by a researcher. SEM estimate two components, the measurement and the structural models. Measurement component depicts the relationships between the latent and observed variables and the structural model is applied to analyse the data and identify the strength and the direction of the relationships among the latent variables (Bollen & Paxton, 1998). Partial Least Squares (PLS) is used to check the reliability and validity of the research model variables.

Research Themes and Sub-Themes: Majority of the sampled articles were themed on MOOC adoption at 57.84% followed by MOOC Engagement & Continuance at 17.65%, MOOC Experience and Appraisal at 16.67%, and MOOC completion at 7.84%. With MOOC completion rate abysmally low around 20% (www.forbes.com) there's a dire need to explore the poor completion rates ((Mulik et al., 2018). We found that majority of the researches on MOOCs are learner focussed (63%) followed by Context and Impact (16%), Design focussed (14%) and Instructor Focussed (7%) which is indicative of the fact that more research

focussing on the instructor is required, as an instructor plays an extremely critical role in shaping students' orientation towards MOOCs.

Theoretical Framework: The most widely used theoretical model in the sampled literature is Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) at 18.03% each followed UTAUT2 and Diffusion of Innovation at 6.56% and 4.92% respectively. TAM was used alone in eleven papers and in another five as an integrated model with another theories and models to explain MOOC or to say the technology adoption phenomenon. The reason for the wide usage of standalone TAM or integrated TAM model in research articles could be attributed to the fact that most of our study papers are themed around MOOC Adoption and this finding resonates with the findings of Lee, Kozar, and Larsen (2013) suggesting TAM being one of widely used model to study technology acceptance.

FUTURE DIRECTIONS AND THRUST AREAS FOR MOOC RESEARCHES

The review and analysis of the sampled literature dataset indicated us of eleven research gaps and future directions in MOOC research, researchers, course creators and designers, practitioners and all other stakeholders must make progress on:

First, with new normal setting in as a result of COVID-19, research to study the changing behavioural patterns of learners, instructors and the providers from cognitive, behavioural and affective (CAB) perspective can reveal good insights. Second, there are not much studies happened around the learning outcomes of MOOC to understand whether improved knowledge quotient has resulted in better employability or the job promotion of the learner. Third, study on learner-centred MOOCs by providing a suitable MOOC environment enabled with learning analytics features to enhance self-reflection, awareness, and self- assessment as well as peer-assessment besides gamification modules to enhance learners' engagement and learning outcomes. Fourth, research studies adopting click stream data than survey data to measure the actual behaviour of learners to understand depth of learners' engagement. Fifth, most of the research happened are learner centric with few towards instructors hence research on instructor motivation and their pedagogical choices to ensure success of students to be explored. Sixth, future studies to explore variables such as experience of using MOOCs, user's digital competence, academic qualifications, and situational factors including government support in making MOOC learning an integral part of education. Seventh, studies to measure instructor's attitude towards MOOC as a force multiplier and knowledge enabler shall give good insights to MOOC developers and the education policy makers. Eighth, sampling unit in MOOC research covered only learners doing graduate, postgraduate or professional MOOC courses. COVID-19 has necessitated research to be carried out on the new entrants to MOOC education, the K12 learners to explore their learning behaviour to understand their engagement and success in learning outcomes. Ninth, research should examine relationships between motivation, language of instruction, language barriers and social engagement. Tenth, further research could be done on MOOC adoption and diversity of the learners in the emerging economics and the role of government in exploiting MOOCs as a means to democratize education. Eleventh, MOOC Poor completion rate is another area least explored therefore a study on it shall provide good insights to the educators as well as the MOOC providers.

CONCLUSION

The advancement of digital technologies and the COVID-19 pandemic scenario have encouraged many premier higher education institutions to launch their own MOOCs. Besides complementing their on-campus education, MOOCs have the potential to enhance learning and teaching through a scalable educational technology platform. This work will help researchers and practitioners to focus on the unexplored and unanswered gaps to advance future research and to continue to expand upon advances in methodological approaches and topics that are considered important to MOOC sustainability, growth, social inclusion, and evolution in the times ahead and to tap the unexplored and potential segments in MOOC arena respectively.

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APPENDICES

Corpus of Sampled Articles

S.no.	Author	Article Classification	Theme	Sub Theme
1	Kizilcec (2016)	Journal Article	MOOC Completion	Learner Focussed
2	Alraimi et al. (2014)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
3	Hone and Said (2016)	Journal Article	MOOC Engagement & Continuance	Design Focussed
4	Wu and Chen (2017)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
5	Bruff et al. (2013)	Journal Article	MOOC Experience and Appraisal	Design Focussed
6	Barak et al. (2015)	Journal Article	MOOC Completion	Learner Focussed
7	Raman et al. (2013)	Journal Article	MOOC Adoption	Instructor Focussed
8	Yousef and Wosnitza (2014)	Conference Paper	MOOC Experience and Appraisal	Design Focussed
9	Attuquayefio and Addo (2014)	Journal Article	MOOC Adoption	Learner Focussed
10	El-Masri and Tarhini (2017)	Journal Article	MOOC Adoption	Learner Focussed
11	Zhou (2015)	Journal Article	MOOC Adoption	Learner Focussed
12	Zhenghao et al. (2015)	Journal Article	MOOC Experience and Appraisal	Context and Impact
13	Pursel et al. (2016)	Journal Article	MOOC Completion	Learner Focussed
14	Shapiro et al. (2017)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
15	Mitja Decman (2015)	Journal Article	MOOC Adoption	Design Focussed
16	Mtebe and Raisamo (2014)	Journal Article	MOOC Adoption	Instructor Focussed
17	Zutshi et al. (2013)	Journal Article	MOOC Experience and Appraisal	Context and Impact
18	Sumak and Sorgo (2016)	Journal Article	MOOC Adoption	Instructor Focussed
19	Yao Xiong et al. (2015)	Journal Article	MOOC Experience and Appraisal	Learner Focussed
20	Milligan and Littlejohn (2017)	Journal Article	MOOC Experience and Appraisal	Learner Focussed
21	Shuiqing Yang (2013)	Journal Article	MOOC Adoption	Learner Focussed
22	Chang et al. (2015)	Journal Article	MOOC Adoption	Learner Focussed
23	Aparicio et al. (2018)	Journal Article	MOOC Completion	Design Focussed
24	Tai-Kuei Yu et al. (2017)	Journal Article	MOOC Adoption	Context and Impact
25	Evans and Myrick (2015)	Journal Article	MOOC Experience and Appraisal	Instructor Focussed
26	Watted and Barak, Israel (2018)	Journal Article	MOOC Completion	Learner Focussed
27	Vaibhav & Gupta (2014)	Conference Paper	MOOC Engagement & Continuance	Design Focussed
28	Ikram Ullah Khan et al. (2017)	Journal Article	MOOC Adoption	Learner Focussed
29	Ngampornchai and Adams (2016)	Journal Article	MOOC Adoption	Learner Focussed
30	Jansen et al. (2015)	Journal Article	MOOC Adoption	Design Focussed
31	Liu et al. (2015)	Journal Article	MOOC Experience and Appraisal	Learner Focussed
32	Skrypnyk (2015)	Journal Article	MOOC Experience and Appraisal	Instructor Focussed
33	Stich and Reeves (2016)	Journal Article	MOOC Adoption	Context and Impact
34	Loizzo (2017)	Journal Article	MOOC Experience and Appraisal	Learner Focussed
35	Rieber (2017)	Journal Article	MOOC Adoption	Learner Focussed
36	Kabaa and Bryson (2013)	Journal Article	MOOC Adoption	Learner Focussed
37	Rebecca Yvonne Bayeck (2016)	Journal Article	MOOC Adoption	Learner Focussed
38	Almatrafi (2018)	Journal Article	MOOC Experience and Appraisal	Design Focussed
39	Larionova (2018)	Journal Article	MOOC Adoption	Context and Impact
40	Hew et al. (2018)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
41	Cole and Timmerman (2015)	Journal Article	MOOC Adoption	Learner Focussed
42	Persada and Miraja (2019)	Journal Article	MOOC Adoption	Learner Focussed
43	Yang and Su (2017)	Journal Article	MOOC Adoption	Learner Focussed
44	Ma and Lee (2018)	Journal Article	MOOC Adoption	Context and Impact
45	Joseph and Nath (2013)	Conference Paper	MOOC Adoption	Design Focussed
46	Jung et al. (2019)	Journal Article	MOOC Experience and Appraisal	Design Focussed
47	Zhang et al. (2017)	Journal Article	MOOC Adoption	Learner Focussed
48	Bonk et al. (2018)	Journal Article	MOOC Engagement & Continuance	Instructor Focussed
49	Aharony and Judit Bar-Ilan (2016)	Journal Article	MOOC Adoption	Learner Focussed
50	Zhen Shao (2018)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
51	Stohr et al. (2019)	Journal Article	MOOC Engagement & Continuance	Context and Impact
52	Marko Radovan (2017)	Journal Article	MOOC Adoption	Instructor Focussed
53	Aydin (2017)	Journal Article	MOOC Experience and Appraisal	Context and Impact
54	Ma and Lee (2019)	Journal Article	MOOC Adoption	Learner Focussed
55	Eli Fianu et al. (2018)	Journal Article	MOOC Adoption	Learner Focussed
56	Bo Li et al. (2018)	Journal Article	MOOC Completion	Learner Focussed
57	Cohen et al. (2019)	Journal Article	MOOC Completion	Learner Focussed
58	Barclay and Logan (2013)	Conference Paper	MOOC Adoption	Design Focussed
59	Ankit Kesharwani 2019	Journal Article	MOOC Adoption	Learner Focussed

S.no.	Author	Article Classification	Theme	Sub Theme
60	Hsu et al. (2018)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
61	Tobias and Reich (2020)	Journal Article	MOOC Experience and Appraisal	Learner Focussed
62	Annabi and Muller (2016)	Journal Article	MOOC Adoption	Context and Impact
63	Deng et al. (2020)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
64	Anitha Kaveri et al. (2015)	Conference Paper	MOOC Adoption	Learner Focussed
65	Sun et al. (2018)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
66	Mohapatra and Mohanty (2016)	Journal Article	MOOC Adoption	Context and Impact
67	Rosaline and Reeves (2017)	Journal Article	MOOC Adoption	Learner Focussed
68	Lawson-Body et al. (2018)	Journal Article	MOOC Adoption	Learner Focussed
69	Zhu et al. (2020)	Journal Article	MOOC Completion	Learner Focussed
70	Wang et al. (2017)	Journal Article	MOOC Adoption	Learner Focussed
71	Oudeweetering and Agirdag (2018)	Journal Article	MOOC Experience and Appraisal	Design Focussed
72	Gameen and Wilkins (2019)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
73	Bozkurt and Aydin (2015)	Conference Paper	MOOC Adoption	Learner Focussed
74	Mulik et al. (2016)	Conference Paper	MOOC Adoption	Learner Focussed
75	Lan and Hew (2020)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
76	Arpaci et al. (2020)	Journal Article	MOOC Adoption	Learner Focussed
77	Albelbisi (2019)	Journal Article	MOOC Engagement & Continuance	Design Focussed
78	Lopez et al. (2019)	Journal Article	MOOC Adoption	Learner Focussed
79	Hudson et al. (2019)	Journal Article	MOOC Experience and Appraisal	Learner Focussed
80	Huanhuan and Li Xu (2015)	Conference Paper	MOOC Adoption	Learner Focussed
81	Tao et al. (2019)	Journal Article	MOOC Adoption	Design Focussed
82	Mulik et al. (2018)	Journal Article	MOOC Adoption	Learner Focussed
83	Sukhbaatar et al. Mangolia (2018)	Journal Article	MOOC Adoption	Context and Impact
84	Al-shami et al. (2018)	Journal Article	MOOC Adoption	Learner Focussed
85	Deng et al. (2018)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
86	Timmy H. Tseng (2019)	Journal Article	MOOC Adoption	Instructor Focussed
87	Al-Adwan (2020)	Journal Article	MOOC Adoption	Learner Focussed
88	Adebo and Ailobhio (2017)	Journal Article	MOOC Adoption	Context and Impact
89	Trehan and Joshi (2018)	Journal Article	MOOC Adoption	Learner Focussed
90	Ma and Lee (2020)	Journal Article	MOOC Adoption	Learner Focussed
91	Pillai and Sivathanu (2019)	Journal Article	MOOC Experience and Appraisal	Context and Impact
92	Hakami et al. (2017)	Journal Article	MOOC Engagement & Continuance	Learner Focussed
93	Ma and Lee (2017)	Conference Paper	MOOC Adoption	Learner Focussed
94	Gao and Yang (2017)	Journal Article	MOOC Adoption	Learner Focussed
95	Lopez et al. (2020)	Journal Article	MOOC Adoption	Learner Focussed
96	Al-Adwan and Khdour (2020)	Journal Article	MOOC Adoption	Learner Focussed
97	Fianu and Blewett (2020)	Journal Article	MOOC Adoption	Learner Focussed
98	Nurhudatiana (2019)	Conference Paper	MOOC Adoption	Learner Focussed
99	Kriti Priya Guptaa (2019)	Journal Article	MOOC Adoption	Learner Focussed
100	Kundu and Bej (2020)	Journal Article	MOOC Adoption	Context and Impact
101	Stackhouse (2020)	Journal Article	MOOC Experience and Appraisal	Instructor Focussed
102	Boonlert (2020)	Journal Article	MOOC Adoption	Learner Focussed