An overview of research topics and focuses of the empirical MOOC literature

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Abstract: Over the years, MOOCs have been an attractive research area and has yielded large quantities of empirical and review studies. However, existing review studies in MOOCs are characterized by short year coverage or focusing on a specific theme. Therefore, we aim to examine the overall research topics, focuses and research productivity of the empirical MOOC literature from 2009 to 2018. Findings show that research in MOOCs have risen significantly since 2013. MOOC studies have mostly focused on learners' completion/dropout, and other learner dropout related topics. Specific types of learners' self-regulation themes in MOOCs were not researched.

Keywords: *MOOCs, Distance education, E-learning, Empirical studies*

INTRODUCTION

Today, MOOCs is one of the most prevalent and most popular form of e-learning that has revolutionized modern education in providing free and global access of online courses in various academic disciplines (Almatrafi, Johri, & Rangwala, 2018; King, Robinson, & Vickers, 2014). Although, this democratization of open and free access of courses has changed along the line since the inception of MOOCs in 2008, as the key providers of MOOC courses such as Coursera and edX have stopped offering certificates and course materials for free (Cook, 2016; Shi, Li, Haller, & Campbell, 2018). Over the last decade, MOOCs have attracted huge attention from e-learning researchers and practitioners especially after the 2012 when the New York times declared 2012 as 'The Year of MOOC' (Pappano, 2012). There has been a substantial growth of research activities and investigation studies

in understanding MOOCs from both teachers, students and pedagogical perspectives leading to the emergence of variety of themes, topics, issues and trends emerging. Similarly, there has also been a considerable number of review studies that examines and reviews various themes and topics in MOOCs. However, these review studies in MOOCs are characterized by short year coverage, usually reporting on MOOC publications of 2 to 3-year span (e.g. see (Liyanagunawardena, Adams, & Williams, 2013; Veletsianos & Shepherdson, 2016; Zhu, Sari, & Lee, 2018)), or focusing on a specific issue/subject in MOOCs (Lee, Watson, & Watson, 2019; Sunar, Abdullah, White, & Davis, 2015). Therefore, we aim to determine the focuses, research topics and overall research productivity of the empirical MOOC studies from the last decade (2009 -2018), to understand what researchers have been focusing on; what MOOC researchers mainly investigate; and also understanding the overall research productivity of the empirical MOOC studies over the last decade.

METHODOLOGY

This study investigates the following three research questions:

1. What are the research focuses in MOOC studies?
2. What are the research topics in MOOC studies?
3. What is the overall research productivity in MOOCs?

In order to fully understand and answer these research questions, we consulted the following electronic databases: ACM Digital Library; IEEE Xplore; Springerlink; Science Direct and Web of Science. We keyed in the word 'MOOC' and/or using 'Massive Open Online Course' into the normal search and advanced search options that best suit each of the identified databases. We adopted an inclusion and exclusion framework for filtering and synthesizing irrelevant set of studies in our MOOC research area, thereby fully focusing our study towards answering our defined research questions. Our inclusion criteria mainly ensure that articles are empirical studies; articles must be peer reviewed; articles that mainly investigates educational aspects of MOOCs, therefore, articles that investigates non-educational aspects of MOOCs such as MOOC software engineers are excluded; articles that show a well-defined goal, methodology, empirical results of the study and offers a substantial contribution to MOOC research

domain; articles with MOOC as a central topic; and articles from 2009 to 2018. In total, 4248 studies were retrieved from our initial search of the five databases, 1279 studies were selected on the basis of relevance, and finally we considered 311 studies based on the application of our inclusion and exclusion criteria, and the general viewpoints of the researchers of this study.

RESULTS

1. What are the research focuses in MOOC studies?
   From our selected 311 empirical MOOC studies, we categorized the general focuses of our MOOC studies into instructor-focused (n= 33), which mainly focused on MOOC instructors such as the challenges of teaching a MOOC course, teachers satisfaction, instructor teaching presence, etc. Student-focused (n =202) studies are studies that investigates students' topics such as dropout/retention/completion, self- regulation, collaborative learning, dishonesty/cheating, motivation to continue learning with MOOCs etc., MOOC pedagogical design-focused (n= 37) involves course design, pedagogical richness etc. Context/Impact (n = 28) involves studies that investigates issues such as effectiveness and flexibility in MOOCs. Other focus (n = 19) studies investigates topics such as MOOCs for disabled, MOOCs for elderly persons etc. Fig 1 below illustrates our selected study focuses

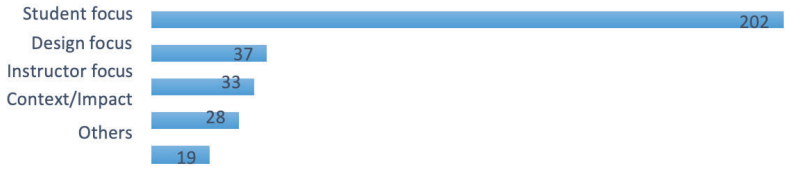


Fig 1: Research Focuses

2. What are the research topics in MOOC studies?

   From our knowledge of MOOCs, other e-learning domains such as blended learning and also inspiration from some influential MOOC studies such as (Zhu et al., 2018), we identified 17 main topics in empirical MOOCs. In addition, we categorized the infrequent MOOC research topics as 'others' totaling a number of 18 topics. The 'others' involves topics such as demographic distributions of MOOC

learners, professional development in MOOCs, underserved students, disabled learners, k-12 MOOC students, blended learning in MOOCs, technological competence in MOOCs etc. Fig 2 gives a representation of the research topics in MOOCs based on our 311 selected studies.

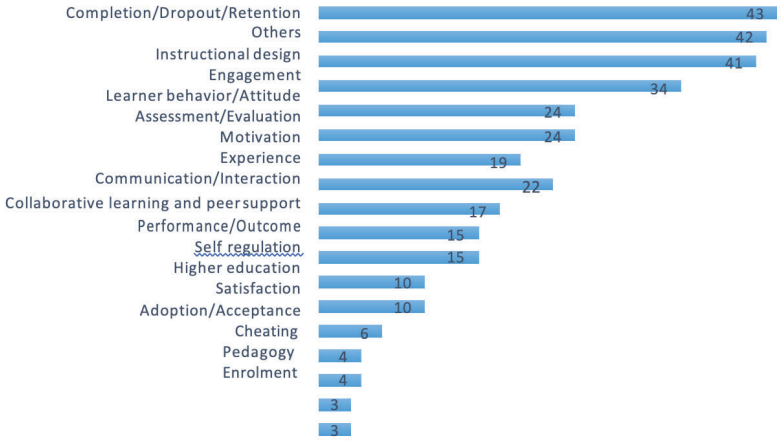


Fig 2: Research topics in MOOCs

WHAT IS THE OVERALL RESEARCH PRODUCTIVITY IN MOOCS?

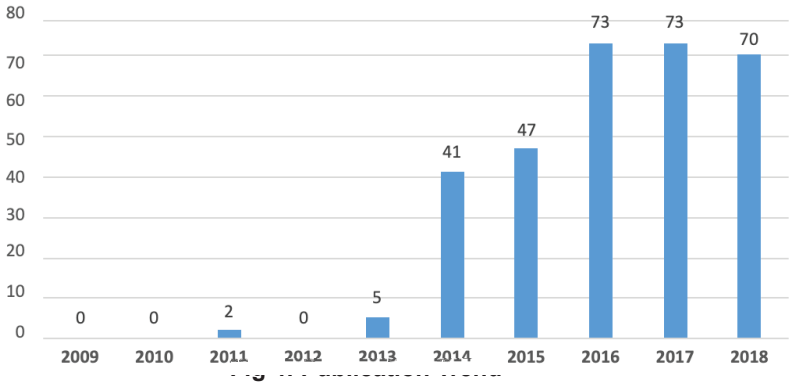
3.1 Publication channels

We categorized our studies based on publication avenue - Journal articles and conference papers. From our 311 selected studies, 173 (56%) consist journal articles, and 138 (44%) are conference papers.

Fig 3: Publication channel

3.2 Publication trend

Although, MOOCs offering of global free online education began in 2008, from fig 4, it is clear that MOOC research activities started significantly in 2013. 2014 and 2015 witnessed a rise in the number of published MOOC studies from five (5) relevant studies in 2013, to 41 publications in 2014 and reaching its peak in 2016 with 73 studies. Arguably, the sudden rise in the number of research publications in MOOCs happens because of the first two MOOC courses (Machine learning (ML) and Artificial intelligence (AI)) that Stanford University in the United States started in 2011 which attracts global attention and recognition and even led the New York Times Magazine declaring 2012 as 'The year of MOOC'. Also, the declaration of 2012 as the year of MOOC possibly restored assurance to the new promising instructional approach (MOOCs), thereby easing and motivating e-learning researchers to continue pursuing and investigating various dimensions of MOOCs. Furthermore, 2017 and 2018 have witnessed a fairly even quantity of publications of 73 and 70 in 2017 and 2018 respectively.



We plot a year-wise bubble-plot graph in order to provide a visualized summary of the topics, trends and the research gaps in MOOC over the years. Fig 5 below provides a fine grain summary of the research topics with respect to the years, as well as the gradual evolution of MOOC research over the years. As the year 2013 witnessed some progress in MOOC research activities compared to previous years, 2014 witnessed an even greater amount of MOOC publications with

41 publications compared to only five publications in 2013. Also, studies in 2014 began focusing on a number of emergent themes and issues in MOOCs such as learners' experience, engagement, behavior and other non-learner related aspects such as instructional design of MOOCs. In 2015, other research dimensions such as dropout (see (Sunar, White, Abdullah, & Davis, 2017)) of MOOC courses emerged, possibly due to learners' dropout rate. Fig 5 shows that research on dropout/completion (e.g. (Sunar et al., 2017)) have been on the rise since 2014. Completion rates have been embarrassingly low as the region of 10% is widely cited (Andres et al., 2018; Davis et al., 2017; García- Peñalvo, Fidalgo-Blanco, & Sein-Echaluce, 2018; Hone & El Said, 2016; Rai & Chunrao, 2016; Sharfina, Santoso, Isa, & Aji, 2017).

Additionally, the number of publications focusing on MOOC instructional design have doubled from three (3) studies in 2014 to six (6) studies in 2015, and the number has kept rising to 12 studies in 2016. However, the figures dropped to eight (8) in both 2017 and 2018. One possible explanation of this might be the quest for fully understanding the structure and design of MOOC instructions, as MOOC instructors are possibly novice in teaching MOOC courses to their respective learners. Other areas of research that have been fairly even across the years are 'satisfaction', 'self-regulation', 'learner behavior' and 'communication/interaction'. Although self-regulation has been ever present in technology-mediated modes of instruction (e.g. blended learning), MOOC researchers seem to be more interested in learners' dropout.

Another finding from Fig 5 is the decline in research on learners' motivation in MOOCs. One possibility is that motivation has less significant impact on MOOC learners as compared to dropout, engagement and instructional design. Other areas of research in MOOCs termed as 'others' involve topics such as learners study patterns, demographic distribution of MOOC learners, gender inequality etc. Fig 5 shows that the number of MOOC publications has been even and consistent on the less frequent MOOC topics.

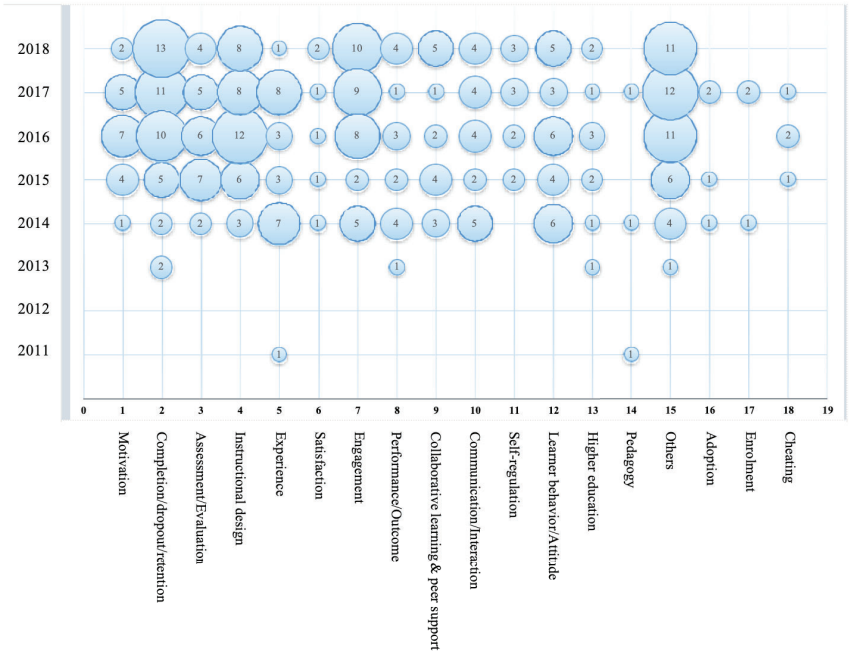


Fig 5: A bubble plot of year-wise empirical MOOC research topics

DISCUSSION

Our study offers a fine grain representation of the topics, focuses and overall research productivity of the empirical MOOC studies over the last decade. Although, it is very difficult to identify all the relevant MOOC studies due to our methodology of only considering the studies that are deemed as 'high impact'. Nevertheless, we are fully assertive that our selected studies provide a representation of the current state of MOOC empirical research in terms of research topics, focuses and overall productivity.

First, our study has found that MOOC research have focused more on issues of learner dropout. Even though, researchers have proposed various strategies, techniques and intervention approaches for reducing the problem of learners dropping out in MOOC courses, research on learner dropouts has not slowed down and has been on the constant high throughout the years. Arguably, many other related research themes such as learner engagement,

interaction and motivation to learn in MOOCs were also research topics directly/indirectly aiming at learners' completion/dropout issue. Our study has also found that MOOC researchers and practitioners have focused less on important research themes/issues such as learners' self- regulation. Although, students self-regulation in online environments has been an inherent problem that

hinders the effectiveness of various online learning mode of instructions (Rasheed, Kamsin, & Abdullah, 2019). In addition, other specific types of learners' self-regulation behavior in MOOCs were not researched such as procrastination. Though, procrastination is considered a psychological behavior (van Eerde & Klingsieck, 2018), that might be the possibility why the majority of the research activities on procrastination behavior comes from the medical and psychological domains. Therefore, future research should investigate the impact, level and causes of MOOC learners procrastination behavior and its effect on dropouts, satisfaction and overall performance. In addition, future research is warranted in fostering learners' self- regulation behavior through external scaffolds such as social identity groupings, personalization (e.g. see (Rahman & Abdullah, 2018)) etc. Research is also warranted to investigate the underlying issues of seclusion, boredom, anxiety that MOOC learners face.

In conclusion, our study has also identified research trends that would better equip and trigger MOOC researchers and practitioners in building upon their MOOC research through exploring the areas in which knowledge is as yet weak and inconclusive.

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