

# Mapping the Factors Influencing Success of Massive Open Online Courses (MOOC) in Higher Education

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## ABSTRACT

Massive Open Online Courses (MOOC) is a new phenomenon in online learning that has aroused increasing interest by researchers as a significant contribution to improving educational system quality and openness. The purpose of this paper is to compile and analyze MOOC research that has been published between 2012 and 2016. A systematic analysis technique was employed and Template Analysis (TA) approach was used for mapping MOOC research into three dimensions in accordance with the Biggs 3P model. First dimension is *Presage*, include the following factors: Learners' characteristics with sub-factors (learner demographics, learner motivation, and interactivity) and instructor. Second, *Process*, including factors of pedagogy, pattern of engagement, instructional design, assessment, credit, plagiarism, sustainability, and learning analytics. Third dimension is *Product*, including factors of student dropout rate and MOOC quality. This classification is aimed at providing a comprehensive overview for readers interested in MOOCs who seek to understand the critical success factors influencing MOOC success.

**Keywords:** MOOC, Massive Open Online Courses, MOOC success, MOOC quality

## INTRODUCTION

Massive Open Online Courses (MOOC) is a new online learning style with significant capability to expand free online courses to a large number of participants worldwide. MOOC provides opportunities with no admission requirements to open up learning and to offer a wide range of choices in different areas and disciplines for a massive number of participants (Liyaganawardena, Adams, & Williams, 2013).

Since 2012, MOOC has received increased attention for its significant influence on lifelong learning as confirmed in the consequential Innovation Reports from the Open University, UK (Sharples et al., 2013, 2014). There is growing interest in MOOC by lifelong learners, higher education institutions, and for-profit platforms (Raffaghelli, Cucchiara, & Persico, 2015) as manifested in Google trends for MOOC. **Figure 1** displays a quick glance of Google Trends when searching for MOOC-related keywords.

A Scopus database was employed to explore the most-used terms as keywords in analysis related to MOOC-related publications, as shown in **Figure 2**.

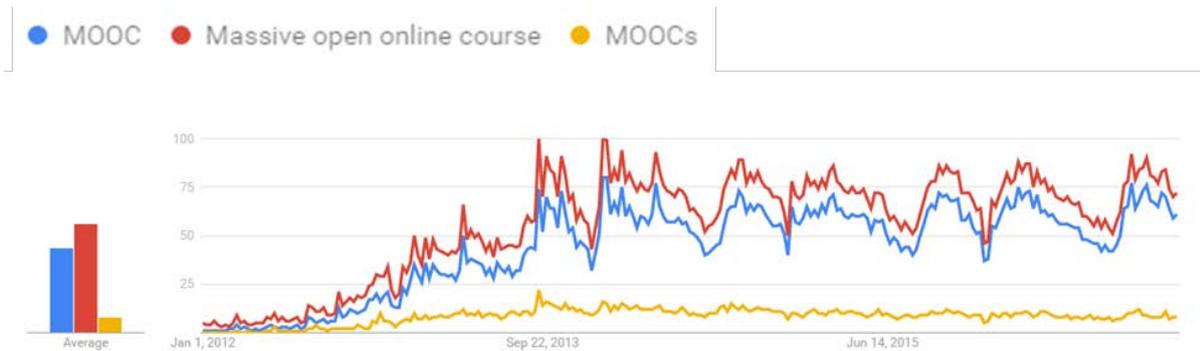
The result from searching the Scopus database revealed 491 publications in which 161 different keywords were used, with the most-used term being "MOOC", used in 113 publications, "Open Course" was used in 108, "Higher Education" in 96, "Massive Open Online Courses" in 59 and "Completion" in 32 publications.

Despite the fact that hundreds of thousands of people around the world are signing up for MOOC systems (Rivard, 2013) only few students complete courses and receive a certificate of completion. Some researchers estimated that the average completion rate of MOOC is below 10% (Alraimi, Zo, & Ciganek, 2015; Hew & Cheung, 2014) while others suggest an even lower than 7% (Parr, 2013).

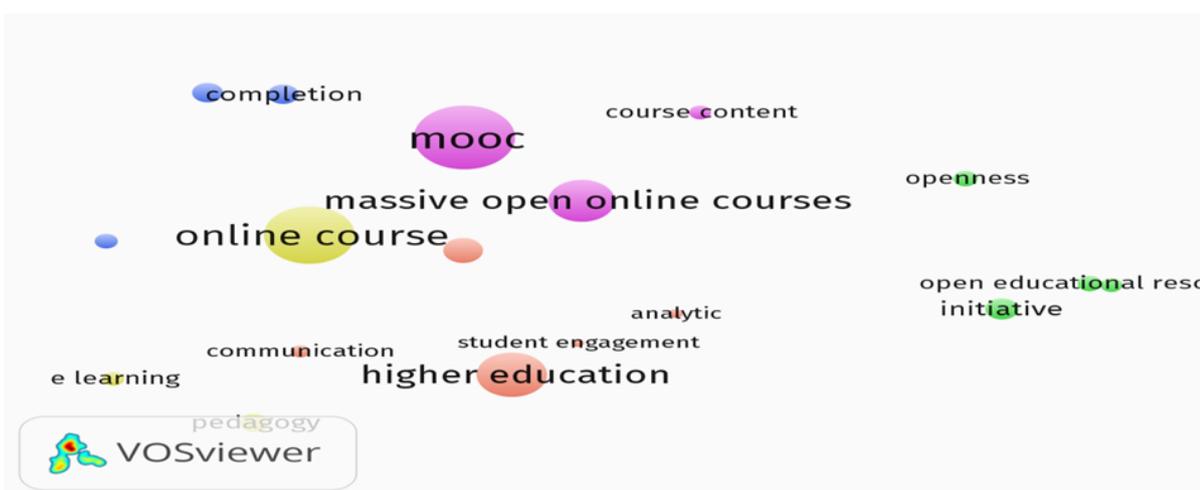
The main reasons for this high dropout rate may be associated with issues of MOOC systems related to courses, services, and education quality factors such as pedagogies, purposes, roles of instructors, learner motivations,

**Contribution of this paper to the literature**

- This study investigates and analyzes the key factors that impact success of MOOC system.
- This paper develops a map of classification that integrates critical factors influencing MOOC system success.
- This study reveals 12 main factors related to successful implementation of MOOC (e.g. learner characteristic, instructor).



**Figure 1.** Google Trends for MOOC related keywords



**Figure 2.** The most term used keyword in Scopus

expectations and behaviors (Milligan, Littlejohn, & Margaryan, 2013) so measuring factors influencing MOOC should be considered a key issue in understanding MOOC success or lack thereof.

While there are widely available studies with empirical evidence that investigate factors influencing success of e-learning (e.g. Yusop, 2015; Yusop & Siti Mariam, 2017), those factors may not be suitable for MOOC because of its unique features (Gamage, Fernando, & Perera, 2015). Therefore, research on the particular critical success factors of MOOC and dealing explicitly with MOOC participants would seem to be required (Yousef, Chatti, Schroeder, & Wosnitza, 2014c). Most importantly, there is a critical need to examine the success factors of MOOC from a systemic point of view, which is virtually non-existent except for a study by Gamage et al. (2015). The current study has tried to fill the current gap in literature by reporting results of a systematic literature review to explore the critical factors influencing success of MOOC systems. Identification of these factors will inform academics and higher education administrators in making informed decisions when adopting MOOC for their institutions and consequently reducing the percentage of failure in MOOC systems.

## LITERATURE REVIEW

MOOC is a recent phenomenon in higher education, and its development is still in infancy, although the body of related research has been progressively growing. There are few systematic scholarly publications related to MOOC. These researches focused on providing descriptive analyses of MOOC literature such as its geographical

distribution, publication outlets, citations (e.g. Liyanagunawardena et al., 2013; Veletsianos & Shepherdson, 2016), and analyses of data collection and analysis methods used in researching MOOC (e.g. Bozkurt, Keskin, & de Waard, 2016; Veletsianos & Shepherdson, 2016). Additionally, other previous researchers have been focusing on students' use of MOOC, mainly focusing on their motivations and challenges (e.g. Hew & Cheung, 2014; Khalil & Ebner, 2014). Others investigated characteristics related to MOOC (e.g. Liyanagunawardena et al., 2013).

While the above-mentioned articles seem to suggest that research topics on MOOC are diverse (Liyanagunawardena et al., 2013; Raffaghelli et al., 2015) and that the research interest about this topic is continually growing (Veletsianos & Shepherdson, 2016) very little research has been done to understand critical factors influencing the success of MOOC. In view of this, there is a need for a review of relevant MOOC literature to gain a better understanding of the phenomenon.

## SIGNIFICANCE OF THE STUDY

The current study represents the first effort to review the MOOC literature that has been published between 2012 and 2016 to understand the critical success factors influencing MOOC success and fills the gap in the literature in this domain. This study adds to the existing MOOC research by investigating in-depth the factors influencing MOOC success to promote successful implementation of MOOC systems within high education contexts.

By applying systematic review techniques, this study intends to contribute to a better understanding of MOOC literature by a mapping of publications related to factors influencing MOOC success based on Biggs's 3P framework to guide researchers, practitioners, institutions, international agencies, associations, and other networks (Anderson & Zawacki-Richter, 2014).

## AIM OF THE STUDY

Even though prior studies have emphasized the importance of MOOC success, there remains a lack of clarity about how MOOC could be successfully and effectively implemented. Moreover, little systematic empirical research has been directed towards thorough investigating and analyzing key factors that impact MOOC success (Gamage et al., 2015), so the primary aim of this study is to investigate factors influencing the success of MOOC.

The specific purpose of this paper is to analyze publications related to MOOC research that has been conducted during the period 2012–2016. A Template Analysis (TA) approach was used to map the conducted research on MOOC with the aim of providing an inclusive overview for readers interested in MOOC to increase their common understanding of critical success factors in this emerging field. This paper also aim to offer researchers interested in the subject a systematic view of the main publications and sources of scientific information related to MOOC.

Within this perspective, the research objectives for this study are as follows:

- To critically analyze the literature on MOOC.
- To identify critical factors influencing the success of MOOC.
- To develop a map of classification that integrates critical MOOC factors.

This study has been guided by the following research questions:

- What is the most active research published between 2012 and 2016 that has explored critical factors influencing MOOC success?
- What are the critical factors that influence the success of MOOC?
- How can critical MOOC factors be integrated into map classification?

## METHODS

This study employed a systematic reviewing protocol to analyze and synthesize MOOC literature, followed by use of a template analysis approach (King, 2012) to map the conducted research on MOOC. Template Analysis is a technique used to thematically organize and analyze qualitative data. It has been applied extensively in social science researches (King, 2012).

Such systematic reviews are intended to provide guidance to researchers planning future studies, and provide convenient summaries of the literature on a particular issue (Petticrew & Roberts, 2008).

In this systematic review, the literature search was based on the following procedures:

- First, the search terms chosen for recognition, based on Scopus analysis, included "MOOC", "MOOCs", "Massive Open Online Course", "Massive Open Online Courses" "MOOC Success", and "MOOC Quality".

- Second, the search terms were used to search major refereed academic databases such as Web of science, Scopus, ERIC, Open Access Journals Search Engine (OAJSE), and Google Scholar. The current study focuses on these particular databases based on their multidisciplinary nature because they export data for bibliographic searching and literature research results in a standardized format.
- Third, select articles published from 2012-2016, a time frame chosen because MOOC studies in earlier years (before 2012) relied heavily on theoretical research (Hew & Cheung, 2014) and generally reflected small sample sizes (Raffaghelli et al., 2015).
- Fourth, apply the following set of selection criteria for articles to be included in the review:
  - The paper should be written in English and published in the period 2012-2016.
  - Since, the primary focus of this review is on factors influencing MOOC success, learners' perceptions toward using MOOC, learners' characteristics, motivations, attitudes, engagement, satisfaction, and MOOC quality, these factors were included.
  - Articles investigating stakeholders such as students and instructors were included, while papers examining other stakeholders such as employers, software engineers, and librarians were excluded.
  - Articles not meeting the selection criteria, e.g., studies exploring political and policymakers' views or studies expressing personal opinions were excluded.
- Fifth, articles relevant to the topic of MOOC success and meeting the preceding criteria were selected based on information provided in their abstracts, followed by reviewing the full text of each article to eliminate articles not clearly related to MOOC systems success.
- Sixth, a secondary literature research was conducted by reviewing the references of each primary source to explore critical factors influencing success of MOOC.

Then, Template Analysis was used as the classification technique for mapping MOOC literature in several dimensions (King, 2012). Thematic analysis is perfectly appropriate to get a clear picture of the basic content of text. Thematic analysis is believed to be one of the most common methods to content analysis, where the coding scheme is based on categories designed to capture the dominant themes existing in the text (Attride-Stirling, 2001; Bryman & Hardy, 2009). Therefore, the template analysis has been chosen purposefully as a document analysis process to foster the recurrent themes found in published articles on factors influencing success of MOOC in higher education. The template analysis has been done manually using printout tables based on four phases:

Phase one: reading the MOOC literature carefully to identify the studies that are familiar with the domain context.

Phase two: formulating codes (themes) based on understanding the studies domain and using existing MOOC classifications by Yousef, Chatti, Schroeder, and Wosnitza (2014b) and Hood and Littlejohn (2016) as a reference to test reliability. Yousef et al. (2014b) used templet analysis to map the research on MOOC into seven dimensions, namely concept, design, learning theories, case studies, business model, targets groups, and assessment. Hood and Littlejohn (2016) identified a range of variables that can be used to measure quality in MOOC using Biggs's (1993) 3P model.

Phase three: Categorizing and calculating the frequency of the critical MOOC factors influencing MOOC success according to Biggs's (1993) 3P model, three templates were identify as follows:

1. **Presage** that represents the input variables that related to teaching and learning process such as the learner characteristics and instructors.
2. **Process** which refers to the environment related with the presage variables (e.g. instructional design, and pedagogical approaches).
3. **Product** that represents the outputs of the educational outcomes such as completion rate.

Phase four: conducting several internal meetings to discuss combining and contrasting the findings from several studies into themes or coding in the textual data (e.g. Instructor, instructional design) then organized them in the templates (e.g. presage, process). **Table 1** displays the classification of the studies included in this review according to the templates and themes.

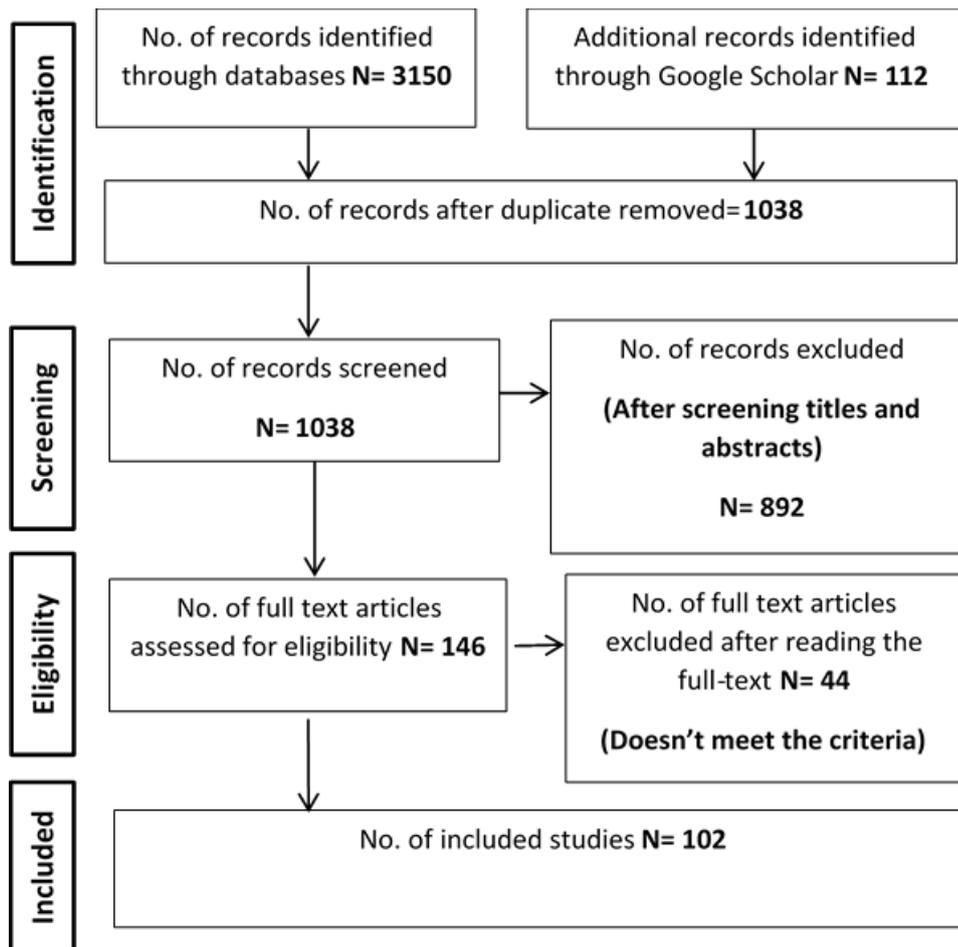
**Table 1.** Classification of selected MOOC papers based on Biggs’s (1993) 3P model

Template	Factor	Studies
Presage	Learner demographics	(Christensen et al., 2013; DeBoer et al., 2014; Ho et al., 2014; Liyanagunawardena, et al., 2015; Morris, 2014; Morris, Hotchkiss, & Swinnerton, 2015).
	Learner motivation	(Abeer & Miri, 2014; Belanger & Thornton, 2013; Davis et al., 2014; Hew & Cheung, 2014; Morris & Lambe, 2014; Wen, Yang, & Rose, 2014b; Zheng, Rosson, Shih, & Carroll, 2015).
	interactivity	(Conole, 2013; Grünewald et al., 2013; Guo, Kim, & Rubin, 2014; Kolås, Nordseth & Hoem, 2016; Li et al., 2014; Mamgain et al., 2014).
	Instructor	(Adamopoulos, 2013; Evans & Myrick, 2015; Ferguson & Whitelock, 2014; Haavind & Sisteck-Chandler, 2015; Najafi, Rolheiser, Harrison, & Håklev, 2015; Rodriguez, 2012; Ross et al., 2014).
Process	Pedagogy	(Ahn, Weng, & Butler, 2013; Bayne & Ross, 2014; Ferguson et al., 2015; Glance, Forsey & Riley, 2013; Istrate & Kestens, 2015; Toven-Lindsey, Rhoads, & Lozano, 2015; Yuan & Powell, 2013).
	Pattern of engagement	(Anderson, Huttenlocher, Kleinberg, & Leskovec, 2014; Ferguson & Clow, 2015; Hew, 2014; Hill, 2013; Kizilcec, Piech, & Schneider, 2013; Milligan, Littlejohn, & Margaryan, 2013; Nelson, 2014; Phan, McNeil, & Robin, 2016; Veletsianos et al., 2015; Waite, Mackness, Roberts, & Lovegrove, 2013).
	Instructional design	(Amo, 2013; Chen, 2014; Downes, 2013; Lin et al., 2015; Littlejohn et al., 2016; Munoz-Merino et al, 2015; Young, 2013).
	Assessment	(Admiraal, Huisman, & Pilli, 2015; Admiraal, Huisman, & Ven, van de, 2014; Clarà & Barberà, 2014; Kulkarni et al., 2013; Piech et al., 2013; Raposo-Rivas, Martinez-Figueira, & Campos, 2015; Reilly, Stafford, Williams, & Corliss, 2014; del Mar Sánchez-Vera & Prendes-Espinosa, 2015; Sandeen, 2013a; Yousef et al., 2015e).
	Credit	(Billington & Fronmueller, 2013; Bruff et al., 2013; El-Hmoudova, 2014; Green, 2013; Hollands & Tirthali, 2014; Jiang et al, 2014; Kursun, 2016; Sandeen, 2013b; Schulze, 2014; Shen & Kuo, 2015).
	plagiarism	(Eisenberg, 2013; Maas et al, 2014; Marshall, 2014; Meyer & Zhu, 2013; North, Richardson & North, 2014).
	Learning analytics	(Chandrasekaran, Ragupathi, Kan, & Tan, 2015; Daradoumis, Bassi, Xhafa, & Caballe, 2013; Kay, Reimann, Diebold, & Kummerfeld, 2013; Lackner, Ebner, & Khalil, 2015; Tabbá & Medouri, 2013).
Sustainability	(Aparicio, Bacao, & Oliveira, 2014; Burd et al., 2014; Dellarocas & van Alstyne, 2013; Kalman, 2014; Parr, 2013).	
Product	Student dropout	(Alraimi et al., 2015; Clow, 2013; Engle, Mankoff, & Carbrey, 2015; Fischer, 2014; Freitas, Morgan, & Gibson, 2015; Greene, Oswald, & Pomerantz, 2015; Hone & El Said, 2016; Jordan, 2014; Khalil & Ebner, 2014; Mackness, Waite, Roberts, & Lovegrove, 2013; Reich, 2014).
	MOOC quality	(Butcher et al, 2013; Gamage, Fernando, & Perera, 2015; Hood & Littlejohn, 2016; Jansen et al, 2016; Margaryan, Bianco, & Littlejohn, 2015; Yousef et al., 2014c).

## RESULTS

In this section, we will present the results obtained from analysis and synthesis of information from the set of selected publications, using the procedures described above.

After eliminating unsuitable articles from both the initial and secondary literature searches, the final result of the systematic review study included a set of 102 publications matching the criteria. A PRISMA process was employed for the search, and **Figure 3** displays the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of critical success factors influencing MOOC.



**Figure 3.** The PRISMA flow diagram of critical success factors influencing MOOC Source: Moher, Liberati, Tetzlaff, Altman, The PRISMA Group (2009)

**Table 2.** MOOC papers by publication year

	2012	2013	2014	2015	2016
No. of publication	1	32	37	25	7

102 studies were included in the data analysis, and each article identified was the basic unit of analysis. This analysis was conducted from year 2012 to 2016, and the collection of MOOC papers sorted by publication year is shown in [Table 2](#).

From the 102 studies, 54 journal articles, 30 conference papers, 12 articles from Web magazines, 5 books, and 1 dissertation were considered as relevant and thus, included for further analyses as displayed in [Figure 4](#).

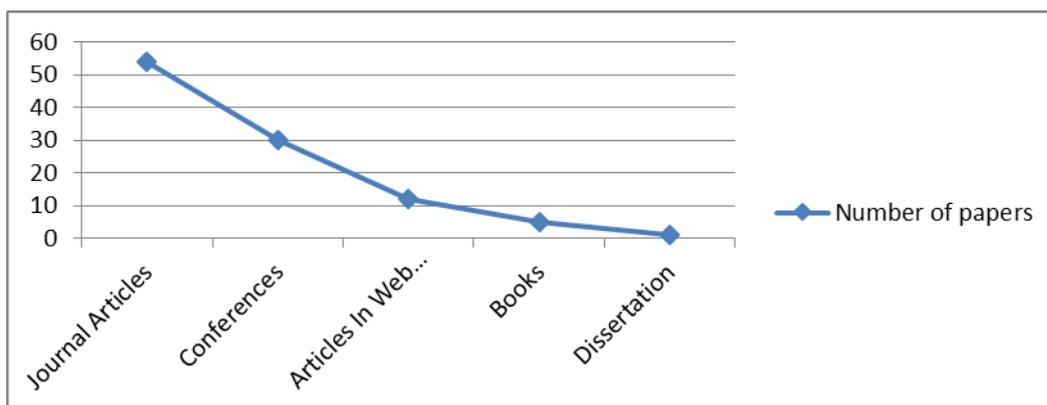


Figure 4. Distribution of articles by type of papers

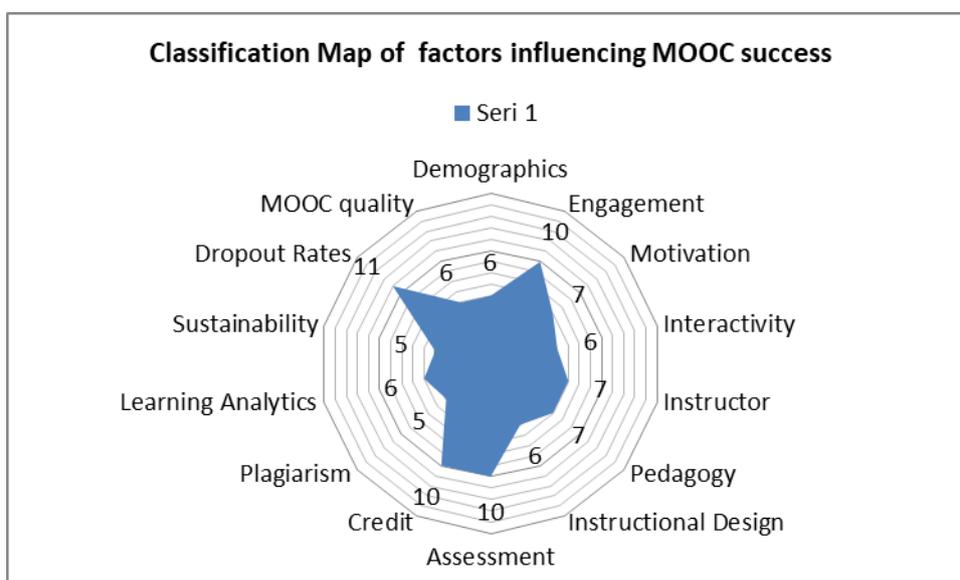


Figure 5. Classification map of factors influencing MOOC success

From this analysis, it can be observed that *The International Review of Research in Open and Distributed Learning*, *Distance Education*, *Computers & Education*, *British Journal of Educational Technology*, and *Journal of Online Learning and Teaching*, were the top 5 journals publishing the greatest number of articles related to MOOC success.

All of the 102 publications that were selected in this review were then mapped into fourteen identified factors that influence the success of MOOC as displayed in the classification map of factors (Figure 5). For example, there were 11 studies that suggested dropout rates as the success factor, followed by engagement, credit and assessment (10 studies each); motivation, instructor, pedagogy (7 studies each); demographics, interactivity, instructional design, learning analytics and MOOC quality (6 studies each); and finally, plagiarism and sustainability (5 studies each).

## DISCUSSION

After identifying critical factors influencing success of MOOC, Biggs’s (1993) 3Pmodel was employed to determine the core components of a MOOC environment. The Biggs model suggests that to understand a particular ecosystem (Biggs, 1993) (e.g., MOOC), it is necessary to break it down into its components and examine how these components relate to one another and how they combine to form the system as a whole. The model divides each learning ecosystem into three types of variables: presage, process, and product. Presage represents input variables related to teaching and learning processes, including learners, motivation, demographics, and instructors. Process variables refer to the environment of the presage variables, including instructional design, and pedagogical approaches. Product variables are the outputs of the educational processes, e.g., outcomes such as completion rate. The Biggs’s 3P model is displayed in Figure 6.

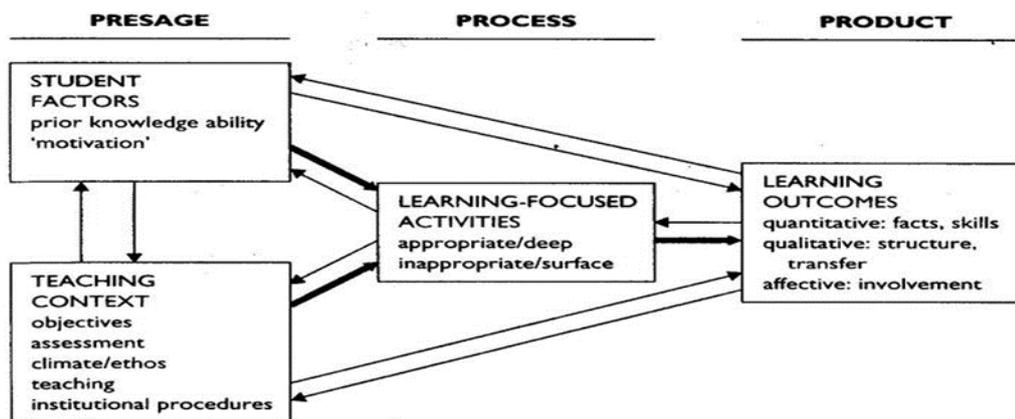


Figure 6. Biggs's 3P model

### Presage Variables

The presage variables represent resources and factors related to teaching and learning processes. In the current study there are two (2) presage factors and three (3) sub-factors identified from the systematic literature review. They are:

#### *Learner characteristics*

Learner participation is one of the most-examined factors and debates in the MOOC literature. The literature reviewed revealed three sub-factors for learner characteristics: learner demographics, learner motivation, and interactivity.

#### *Learner demographics*

While a host of studies have investigated learner demographics, the current literature exploring MOOC currently are not attracting the diversity of learners originally expected. MOOC demographics show that most MOOC learners are already employed, are well-educated, are from developed countries and have been involved in higher education (DeBoer, Ho, Stump, & Breslow, 2014; Liyanagunawardena, Lundqvist, & Williams, 2015).

Christensen et al. (2013) conducted a study published by the University of Pennsylvania in November of 2013 that surveyed nearly 35,000 students from 200 countries who participated in 32 Coursera MOOC. Examining the demographic backgrounds of these MOOC learners revealed that (83%) of participants had a post-secondary degree and (79.4%) had a bachelor's degree or higher. (40%) were under the age of 30, while fewer than (10%) were over 60. There were significantly more males (56.9%) than females, and (62.4%) were employed full-time or self-employed, with only (13.4%) unemployed or retired.

#### *Learner motivation*

Motivation plays a vital role in student determination to enroll and continuously participate in MOOC. Wen, Yang, and Rose (2014b) confirmed that, the greater the learner motivation, the lower the risk of dropout.

Learners are motivated to join MOOC for different purposes. Common factors include: interest in the topic, access to free learning opportunities, a desire for refreshing knowledge, an opportunity to draw on world-class university knowledge, and gaining accreditation (Davis et al., 2014).

Hew and Cheung (2014) reported four reasons for why learners sign up for MOOC: a) interest in new technology, b) extending current knowledge, c) collecting as many completion certificates as possible, and d) learning as a personal challenge.

#### *Interactivity*

Interaction is the key to participant MOOC success (Khalil & Ebner, 2014), and many researchers pointed out its importance in MOOC environments. Conole (2013) indicated that understanding how learners interact with MOOC should be considered. Kolås, Nordseth and Hoem (2016) pointed out that interactivity in MOOC motivates learning through enhancement of student engagement in a topic.

### ***Instructor***

Instructors' motivation for MOOC instruction, their experience in teaching and developing MOOC, and their satisfaction in teaching MOOC have been investigated in many studies (Evans & Myrick, 2015; Najafi, Rolheiser, Harrison & Håklev, 2015). Ross, Sinclair, Knox, and Macleod (2014) argued for the importance of acknowledging the complexity of teacher roles and experiences in MOOC, and how they influence learner engagement.

Further research suggests that instructor participation in discussion forum activities during the execution of a MOOC activity can actively support learners and positively influence learning outcomes. Guo, Kim, and Rubin (2014) found that short videos, inclusion of instructor talking-head videos, and presence of drawing-hand style instructions were the most commonly useful factors for enhancement of student engagement in MOOC. Abeer and Miri (2014) found that student participation in MOOC can be affected by instructor-provided features, including clarity of explanations, visualization of abstract concepts, support and communication, and assignment variety.

### ***Process Variables***

Process variables refer to processes and actions related to the presage variables, and in this study eight (8) process variables were identified. They are:

### ***Pedagogy***

A host of studies (e.g., Toven-Lindsey, Rhoads, & Lozano, 2015) have investigated MOOC pedagogy. The literature highlights that design MOOC should be clear, consistent, and coherent, and representing a well-defined pedagogical approach (Istrate & Kestens, 2015).

MOOC has evolved into two different pedagogical styles: cMOOC and xMOOC. Broad attempts have been made to distinguish between these styles based on how teaching and learning takes place under their influence. cMOOC are classified with respect to their social mode of learning, while xMOOC are institutionally focused and dependent on video-lecture contents and automated assessment (Bayne & Ross, 2014). cMOOC focuses on connection and collaborative learning while xMOOC emphasizes the extension of existing pedagogical models (Yuan & Powell, 2013).

Because of the contrast between cMOOC and xMOOC, the recent literature has begun to move away from separately considering these basic two styles of MOOC and more toward mediating the contrasts between them (Grunewald, Meinel, Totschnig, & Willems, 2013).

### ***Pattern of engagement***

Student engagement in MOOC has achieved a significant interest in the literature (e.g. Phan, McNeil & Robin, 2016). Many studies define engagement in terms of interaction of the learners with instructional materials such as lectures, manuscripts, and assessments, with the data obtained analyzed by different methods to determine trends and patterns in engagement with materials (e.g. Veletsianos, Collier, & Schneider, 2015).

The literature has reported that the complexity and diversity of MOOC participants' perspectives and learner patterns are considered to be one main reason of a high MOOC dropout rate (Waite, Mackness, Roberts, & Lovegrove, 2013), so an understanding of the different patterns of MOOC participants and their perspectives when participating in MOOC appears to be needed.

Hew (2014) studied the features of 965 course participants across three disciplines that have encouraged student engagement in MOOCs and suggested five that promote student engagement: problem-centric learning, instructor accessibility and passion, active learning, peer-interaction, and helpful course resources.

### ***Instructional design***

The literature has identified questions related to quality of MOOC courses (Chen, 2014) indicating the importance of using high-quality content resources and activities to create an effective instructional design (Amo, 2013). Designing a MOOC should be based on a participatory form to increase understanding of learner diversity and provide learning activities that support different learning styles and needs (Margaryan, Bianco, & Littlejohn, 2015).

In addition, studies have recommended use of quality measures to assess both content and resource design and learner engagement. For instance, Munoz-Merino, Ruiperez-Valiente, Alario-Hoyos, Perez-Sanagustin, and Delgado Kloos (2015) suggested application of the Precise Effectiveness Strategy in a MOOC environment to evaluate effectiveness of learner interactions with educational resources and activities.

Other examples of such frameworks that have been employed to address MOOC quality include: the Quality Matters guide (<https://www.qualitymatters.org>), iNACOL (<http://www.inacol.org>) and OpenUpEd ([http://www.openuped.eu/images/docs/OpenupEd\\_quality\\_label\\_-\\_Version1\\_0.pdf](http://www.openuped.eu/images/docs/OpenupEd_quality_label_-_Version1_0.pdf)). iNACOL, for example, is a framework that has been expanded to address MOOC. It includes multiple standards and rubrics for measuring quality course design, instruction, and programs.

### *Assessment*

Assessment is an important factor in determining the future success of MOOC (Yousef et al., 2015e), and the ability to evaluate enormous number of learners in MOOC systems is considered a critical issue (Sandeem, 2013a). Most MOOC platforms offer assessment models such as peer assessment or online quizzes (Raposo-Rivas, Martinez-Figueira, & Campos, 2015).

The quality of MOOC assessments has been evaluated by some authors. Admiraal, Huisman and Pilli (2015) examined the quality of the various assessment forms (quizzes, self-assessment and peer assessment of an essay) in three MOOCs and explored how these assessments were related to the final exams. The findings also revealed that completion of weekly quizzes was the strongest variable with respect to predicting final exam results.

### *Credit*

MOOC literature has explored the rapid growth and interest in issues related to the effects of providing credit in MOOC learning environments (Kursun, 2016). Green (2013) indicated that if universities provide MOOC credits, this would create real potential for these certificates to be accepted in the real market. El-Hmoudova (2014) highlighted that providing formal course credit can decrease the dropout rate in MOOC.

Researchers debate how and whether university credit might be offered by MOOC (Bruff, Fisher, McEwen, & Smith, 2013). The literature reveals that, although many MOOC offer certificates or badges for successful completion of a course, there is an absence of formal course credits (Shen & Kuo, 2015). Moreover, a digital badge or a certificate provided by some MOOC platforms contains little value (Jiang et al., 2014), and a successful MOOC completion is not recognized as a formal credit by most universities (Billington & Fronmueller, 2013).

Some educational entities, however, have recently become prepared to grant credits for MOOC. For example, the American Council on Education has approved some of the MOOC courses (Hollands & Tirthali, 2014).

### *Plagiarism*

The copyright issues and its impact on both instructors and learners such as using of copyright materials, course content ownership, and accessibility of open access materials are important factors affecting the future success of MOOC (Marshall, 2014). Many studies investigated plagiarism in MOOC (e.g. North, Richardson & North, 2014) and found the main challenge to be how to validate original work and how to prevent plagiarism. It is important to verify the identity of each student to ensure that a person enrolling in a course is the person who takes the exam. Further research has explored technologies that could be employed to prevent cheating through techniques to ensure fair testing conditions (Meyer & Zhu, 2013), and including technologies that confirm personal identity (Sandeem, 2013a) such as employing signature tracking.

### *Sustainability*

Although MOOCs are providing free courses, they are not free to create or to support. For example, the University of Edinburgh, the first UK institution to join the Coursera platform, has spent on average, from development to delivery, about 45,000 USD on each course (Parr, 2013), thus demonstrating that MOOCs are certainly not free to create or offer, so it is important to identify ways in which MOOCs can generate income to cover such costs and become economically sustainable.

Many research studies have looked at models that would contribute to the sustainability of MOOCs and support MOOCs platforms. Aparicio, Bacao, and Oliveira (2014), for instance, identify sponsorship and data analytics as potential main streams of revenue for MOOCs. Burd, Smith, and Reisman (2014) suggested that charging a fee for certification, connecting students with employers, and charging a fee for extra services are business models that could be appropriate for MOOCs. Their suggestions are aligned with Dellarocas and van Alstyne (2013) who proposed that any institution offering MOOCs should consider various different groups such as students, employers, sponsors, and other platforms who could be expected to pay for MOOCs.

## *Learning analytics*

Learning analytics represent a potential for offering insight into learner and instructor participation in collaborative and interactive activities in MOOCs by providing both individual and general information for supporting learning experiences.

Several studies have suggested applying learning analytics tools to better personalize and fit MOOCs to learners (Daradoumis, Bassi, Xhafa, & Caballe, 2013; Lackner, Ebner, & Khalil, 2015; Tabba & Medouri, 2013) and to support learners in their individual learning experiences (Yousef et al., 2014c). Ebben and Murphy (2014) provide a systematic review of MOOCs, highlighting the growth of learning analytics along with the process of delivering MOOCs.

## **Product Variables**

Product variables are the outputs or outcomes of the educational processes. The results of this study suggest the following two (2) product variables related to MOOCs:

### *Student dropout rate*

MOOC completion is an active area in MOOCs literature, and there is a significant volume of published research on this problem (e.g. Fischer, 2014). Studies indicated that MOOCs are facing high dropout rates (Alraimi et al., 2015; Clow, 2013) with only about 3-10% of students successfully completing the MOOCs (Jordan, 2014).

Many studies have examined the reasons behind MOOCs low retention rates. Clow (2013) asserted that learners pass through the following four stages of dropout in MOOCs associated with a funnel of participation: awareness, registration, activity, and progress. Awareness occurs when potential participants learn about the MOOCs. A small fraction of these potential participants then enter the phase of registration to sign up to take the course. A small fraction of registrants then engage in an activity phase and actively participate in the MOOCs. Finally, only a small fraction of active registrants makes adequate progress and completes a MOOC course.

Other researchers such as Mackness, Waite, Roberts, and Lovegrove (2013) explored the direct factors of autonomy and learner involvement influencing completion of MOOCs. Greene, Oswald, and Pomerantz (2015) also investigated factors that affect learner retention and the characteristics of the participants within MOOCs, revealing that prior experience of MOOC and self-rated commitment to completing a course were the most statistically significant predictors of outcome.

### *MOOCs quality*

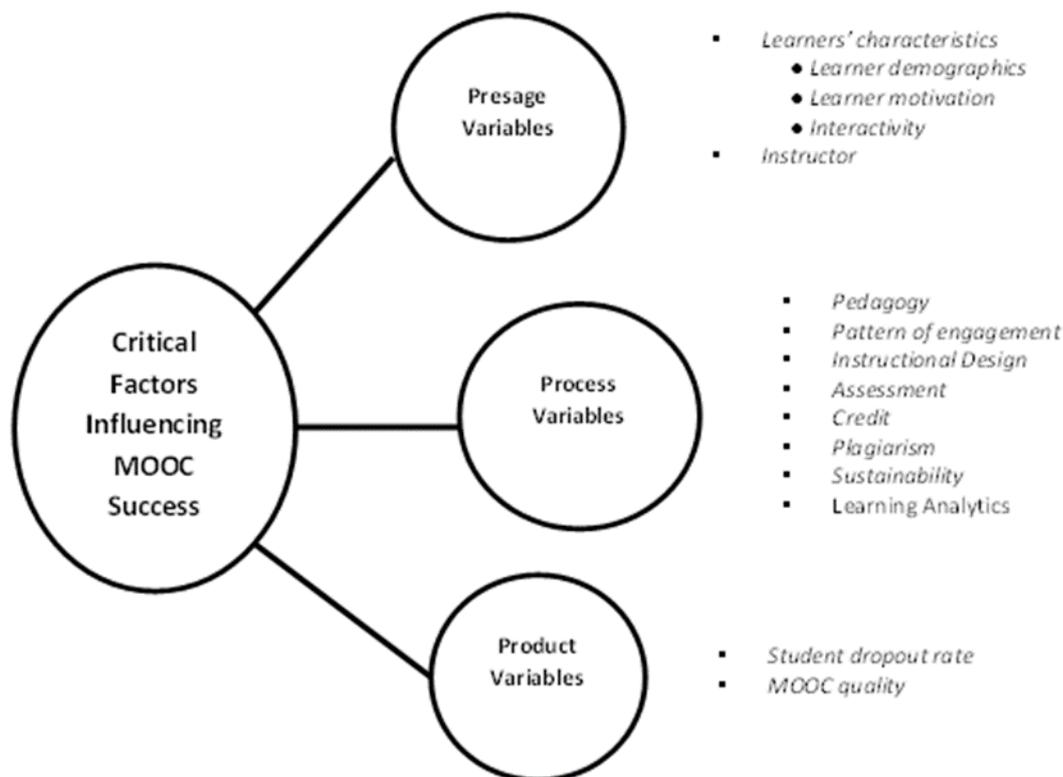
MOOCs quality have not yet been clearly defined in the literature and should be more completely investigated (Yousef et al., 2014c). A study by Gamage et al. (2015) is a testament to this matter. They conducted a literature review that studied 4745 peer-reviewed publications in the period (2012-2015) to determine MOOC quality factors, and the findings revealed a significantly small amount of empirical evidence with respect to this issue. Only 26 papers were found to be highly-relevant with respect to examining MOOC quality. From 26 publications, only 7 were provided with proposal frameworks and only 3 offered quality dimensions supported with empirical evidence.

Furthermore, there is a lack of agreement on the most suitable measurement of quality in MOOC (Hood & Littlejohn, 2016) which may explain the limited studies examining critical success factors of MOOC (Gamage et al., 2015). Most of the MOOC literature describes measurement of MOOC quality by assessing completion rates (e.g. Hone & El Said, 2016), but other research (i.e. Littlejohn, Hood, Milligan, & Mustain, 2016) suggests that such a variable (e.g., completion) is not always the goal of individual learners and not really compatible with satisfaction or learner perceptions of successful learning and therefore is not considered an appropriate measure of the quality of learning.

Evaluating MOOC learning requires development of new measures of success and quality that include diversity with respect to both participant and intentions (Bayne & Ross, 2014). MOOC quality can be viewed and measured in various ways. DeBoer et al. (2104) suggested that evaluating participation and achievement in MOOC should be in accordance with the diverse motivations, goal orientations and actions of participants, thus reflecting the dimensions of MOOC quality (Hood & Littlejohn, 2016).

## **CONCLUSIONS**

Although the MOOC movement is gaining in popularity in higher education contexts, this does not necessarily mean that higher education institutions should immediately join the bandwagon. The purpose of this research has



**Figure 7.** The critical factors influencing MOOC success

been to analyze and map publications related to MOOC research to better understand factors influencing MOOC success. A systematic literature review approach was used to identify and analyze key factors that impact MOOC success.

The findings of this study reveal 12 main factors related to successful implementation of MOOC. They are: Learner characteristic with sub-factors (learner demographics, learner motivation, and interactivity), instructor, pedagogy, pattern of engagement, instructional design, assessment, credit, plagiarism, sustainability, learning analytics, student dropout rate, and MOOC quality. These factors are classified into three levels: presage, process, and product variables, according to Biggs 3P model as displayed in **Figure 7**.

Consideration of these elements will ensure that the MOOC is designed and delivered effectively to ensure meaningful learning occurs and result in learning satisfaction among MOOC learners, thereby achieving success with MOOC systems.

Another important thing worth highlighting is that, as in any e-learning movement, enculturation of MOOC will require full participation from all the actors involved, especially the instructors and learners. Special attention needs to be given to recruitment, training, and support for instructors involved in such initiative (Ghaffar et al., 2016) to ensure that they are ready and fully-armed with the pedagogical approaches needed in planning and implementing MOOC to result in satisfaction and meaningful learning experiences for MOOC learners.

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