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Research Article

How can student engagement be improved in massive open online courses?

Ahmet Uçar *[1], Mustafa Sarıtepeci [2]

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ABSTRACT

Today, factors such as the increasing population, the change in expected competencies in daily, social, education, and business life, the need for continuous education, and the increase in the importance of lifelong learning have brought about the diversification of educational environments. Massive open online courses and distance education environments provide great convenience, especially for individuals with limited time and space to meet this increasing need. However, in the literature, negative situations such as the inability to complete the course and low attendance are frequently reported in massive open online settings. There are numerous studies of student engagement in massive open online courses. The focus of systematic studies on this topic is the barriers and challenges to student engagement in such settings. In this study, we focus on the factors (internal and external) affecting student engagement from a systematic perspective. Starting from this, we reviewed 100 studies concentrated on massive open online courses and student engagement in the Web of Science database. The prominent internal factors affecting student engagement in massive open online environments are motivation, self-efficacy, cooperation, and loyalty. The principal external factors are interaction, gamification, feedback, course structure, and design.

*Corresponding Author, ahmetucar714@gmail.com
[1]Gazi University, Türkiye
[2]Necmettin Erbakan University, Türkiye

Kitlesel açık çevrimiçi ders ortamlarında öğrenci katılımı nasıl geliştirilebilir?

MAKALE BİLGİ

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ÖZET

Günümüzde artan nüfus, günlük, sosyal, eğitim ve iş yaşamındaki beklenen yeterliklerin değişmesiyle birlikte sürekli eğitim ihtiyacı ve bunun bir sonucu olarak hayat boyu öğrenmenin önemin artması gibi faktörler eğitim ortamlarının çeşitlenmesini beraberinde getirmiştir. Bu artan ihtiyacı karşılamaya dönük özellikle zaman ve mekan konusunda sınırlılıkları bireyler için kitlesel açık çevrimiçi dersler ve uzaktan eğitim ortamları büyük kolaylık sağlamaktadır. Ancak literatürde kitlesel açık çevrimiçi ortamlarda sıklıkla kursu tamamlayamama ve düşük katılım gibi olumsuz durumlar belirtilmiştir. Kitlesel açık çevrimiçi derslerde öğrenci katılımı ile ilgili çok sayıda çalışma vardır. Bu konuyla ilgili sistematik çalışmaların odak noktası bu gibi ortamlarda öğrenci katılımı önündeki engeller ve karşılaşılan zorluklardır. Bu çalışmada ise odak noktamız öğrenci katılımını etkileyen faktörleri (içsel, dışsal) sistematik bir bakış açısı ile almaktır. Buradan yola çıkarak Web of Science veri tabanında yer alan kitlesel açık çevrimiçi dersler ve öğrenci katılımı başlıklarını içeren 100 çalışma incelenmiştir. Kitlesel açık çevrimiçi ortamlarda öğrenci katılımını etkileyen içsel faktörlerde öne çıkan faktörler motivasyon, öz yeterlik, işbirliği ve sadakattir. Öne çıkan dışsal faktörler ise etkileşim, oyunlaştırma, geribildirim, kurs yapısı ve tasarımıdır.

1. Introduction

The diversification of education needs due to the new knowledge and competence needs of individuals in their business, social and personal lives, and the search for education with higher efficiency in a short time increases the demand for online options such as Massive Open Online Courses (MOOCs). The increasing demand for online environments and the flexible nature of MOOCs educational environments are promising (De Freitas et al., 2015). On the other hand, in MOOCs environments, ensuring student continuity and keeping students in the system is the most crucial problem (Alemayehu & Chen, 2021; Antonaci et al., 2019; Floratos et al., 2017; Ripiye, 2016). The most basic source of this problem and one of the most effective intervention options to overcome this problem is student engagement because learner participation is one of the most important indicators of the quality of a learning process (Sarıtepeci & Çakır, 2015). Different variables affect student participation in online environments compared to face-to-face learning environments. The studies conducted in the field mention internal and external factors that affect student engagement in online environments (Casson et al., 2017; Dubbaka & Gopalan, 2020; Kuo et al., 2017; Lan & Hew, 2020; Ripiye, 2016; Romero-Rodríguez et al., 2020; Sun & Bin, 2018; Sun et al., 2019). These studies expressed various recommendations regarding the factors that may increase student engagement and the duration of their stay in the system. Some of the most prominent of these recommendations relate to the impact of course structure and design on students' performance and engagement (Anutariya & Thongsuntia, 2019). However, some internal and external factors negatively affect engagement, such as not having enough time and not wanting to complete the course (Dubbaka & Gopalan, 2020).

There are numerous studies in the literature on the factors affecting learner engagement in MOOCs settings (i.e., Casson et al., 2017; Floratos et al., 2017; Koukis & Jimoyiannis, 2017; Liu et al., 2022; Ortega-Arranz et al., 2018; Ramesh et al., 2018; Rizzardini & Amado-Salvatierra, 2018; Rodrigues et al., 2016). Alemayehu and Chen (2021) addressed barriers to student engagement in terms of learners and teachers in MOOCs settings with a systematic review of studies published in SSCI-indexed journals between 2014 and 2020. Estrada-Molina and Fuentes-Cancell (2022) reviewed 40 studies indexed in Web of Science and Scopus that looked at engagement and desertation in MOOCs environments and focused on the challenges of engagement on these platforms. In this study, we discussed the factors for improving learner engagement in MOOCs environments in published papers (i.e., articles, reviews, book chapters, and proceeding papers) in WoS Core Collection holistically. A systematic perspective on what can be done to ensure that students participate and stay in the system is essential. For this reason, the focus of this study is to reveal and classify these factors and to determine the factors related to improving student participation.

1.1. The Purpose of Study

This study aims to determine the trends in the publications published in WoS Core Collection about student engagement in MOOCs environments and the internal and external factors that affect the improvement of engagement in MOOCs environments. In this context, we sought answers to the following research questions:

RQ1: What is the distribution of studies by year?

RQ2: What is the distribution of the examined weavings by document type?

RQ3: How is the distribution of the articles in the SSCI-indexed, by to the Journal Impact Factor (JIF) value, according to their quartile categories?

RQ4: How is the distribution of the articles indexed in the E-SCI, SSCI, or SCI-E, by the Journal Citation Indicator (JCI) values, according to their quartile categories?

RQ5: What are the descriptive findings of the JFI values of the articles in the SSCI-indexed?

RQ6: What are the descriptive findings of the Journal Citation Indicator (JCI) values of the articles indexed in the E-SCI, SSCI, or SCI-E?

RQ7: What are the prominent internal factors related to learner engagement in MOOCs settings in the studies reviewed?

RQ8: What are the prominent external factors related to learner engagement in MOOCs settings in the studies reviewed?

1.2. Student Engagement

Ensuring student engagement in learning and training processes and ensuring its continuity form the basis of many factors in terms of the effectiveness and efficiency of the teaching process (Saritepeci & Çakır, 2019). In addition, since student engagement is sensitive to changes in the learning-teaching process (Fredricks et al., 2016), it is at the center of interventions in studies to improve the teaching process (Alexandron et al., 2022; Deng et al., 2020; Liu et al., 2018; Ramesh et al., 2018; Sarıtepeci & Çakır, 2015; Sun & Bin, 2018). Student engagement is one of the most important indicators of the quality of the learning-teaching process. There are different perspectives on defining student engagement. However, there is a consensus that student participation consists of interrelated sub-dimensions. The most frequently referenced framework in the literature refers to a three-dimensional student engagement: behavioral engagement, affective engagement, and cognitive engagement (Fredricks et al., 2004).

Behavioral engagement includes exhibiting positive behavior, obeying rules, attending class, avoiding disturbing behaviors, participating in learning and academic tasks, and participating in school-related activities (Fredricks et al., 2004). (ii) Emotional engagement includes affective reactions such as happiness, excitement, interest, and boredom related to the course (Fredricks et al., 2004; Handelsman et al., 2005; Skinner & Belmont, 1993). (iii) Cognitive engagement is expressed as students' willingness to invest in learning and make an effort using cognitive, metacognitive, and volitional strategies (Fredricks et al., 2004). In addition, Biggs (1989) expressed cognitive involvement as a unique construct that shapes students' individual experiences of how they continue to learn.

2. Method

This study examines the papers dealing with learner engagement and factors that improve engagement in MOOC settings. The descriptive content analysis depicts current trends in studies on a particular topic in the literature (Çalık & Sözbilir, 2014; Dinçer, 2018) (e.g., Bilgili et al., 2021; İzci, 2018; Wolfrom, 2010). The primary use of this method is to examine the qualitative and quantitative studies on a particular subject and to reveal the related trends (Selçuk et al., 2014). We followed the processes of determining the review, inclusion, and exclusion criteria, reaching the papers related to the keywords determined in the WoS database, and analyzing the collected data.

2.1. Data Sources and Search Strategies

In this study, we examined published, or early access papers that deal with student participation in MOOC settings indexed in the Thomson Reuters Web of Science Core Collection database and published until October 21, 2022. We used the following criteria in this review:

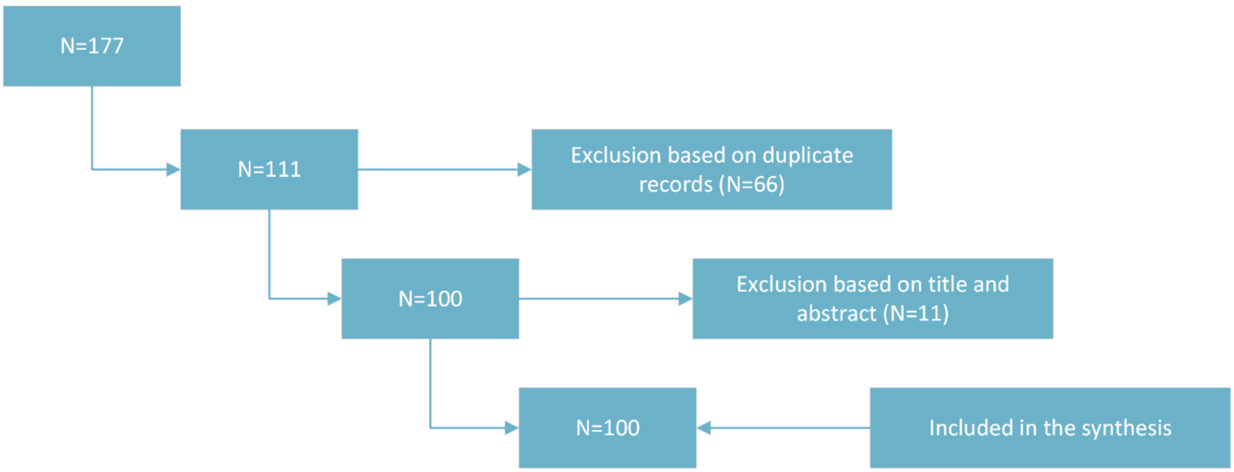
- It should be included in the Web of Science Core Collection
- The title and/or keyword must also contain one of the following search terms:
    - "engagement" AND "MOOC"
    - "engagement" AND "Massive Open Online Course"

2.2. Inclusion and exclusion process

In the study, we presented detailed information about the inclusion and exclusion process in the PRISMA flowchart (Fig. 1). In WoS Core Collection, we reached 177 papers using the search terms presented in the previous section. When we removed duplicate records, 111 studies remained. In the next stage, we examined the titles and abstracts of the studies. We excluded ten studies that were determined not to be related to the purpose of the study. Finally, 100 relevant studies were selected.

Figure 1

PRISMA flow diagram of paper selection process

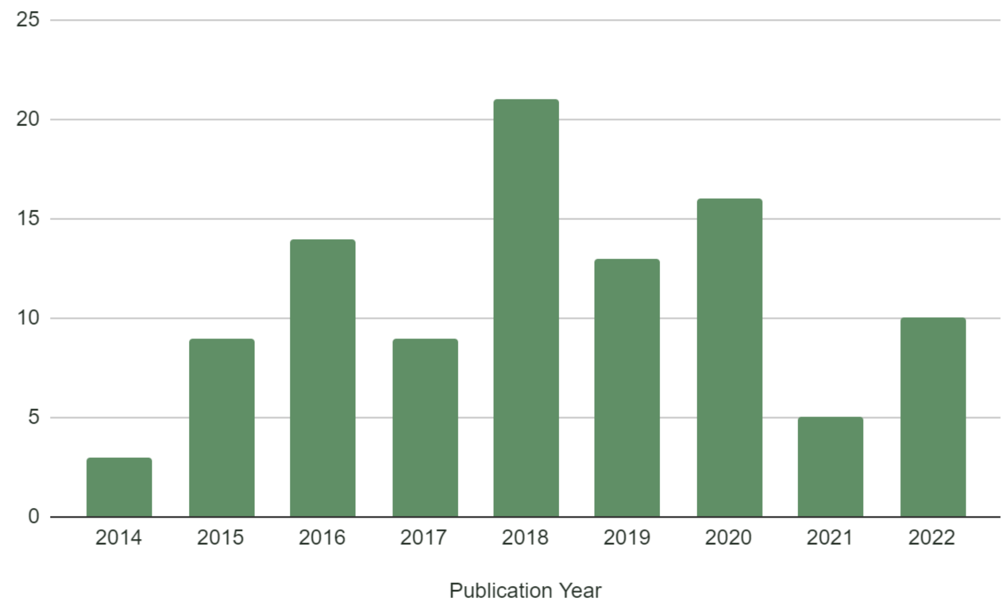


3. Result

A hundred paper related to student participation in Massive Open Online Courses was examined, and the frequency and percentage distributions of the published studies by year are presented in Figure 2. Accordingly, distribution by years, the highest number of publications on this subject belongs to 2018, with a rate of 21%. There has been a remarkable increase in the number of papers towards the end of the 2010s. However, there is a dramatic decrease in the number of papers on student engagement in MOOC settings in 2021, when the pandemic is at the top of the agenda.

Figure 2.

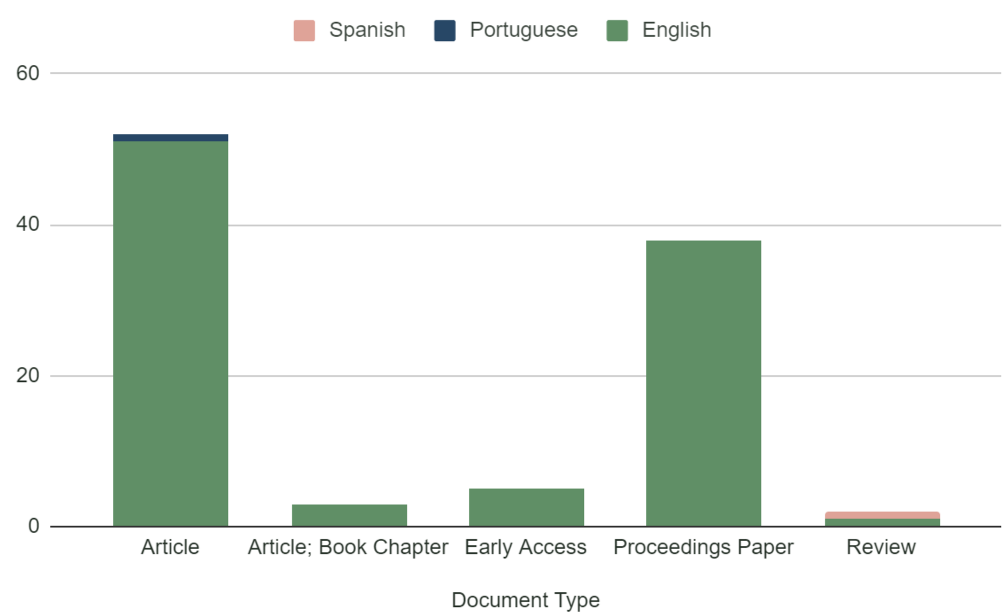
Distribution of studies by years



According to the distribution of the studies by document type (Fig. 3), approximately half of the studies (f=52) are articles. In addition, 38% of the studies are in the type of proceedings papers. All but two of the studies are in English.

Figure 3.

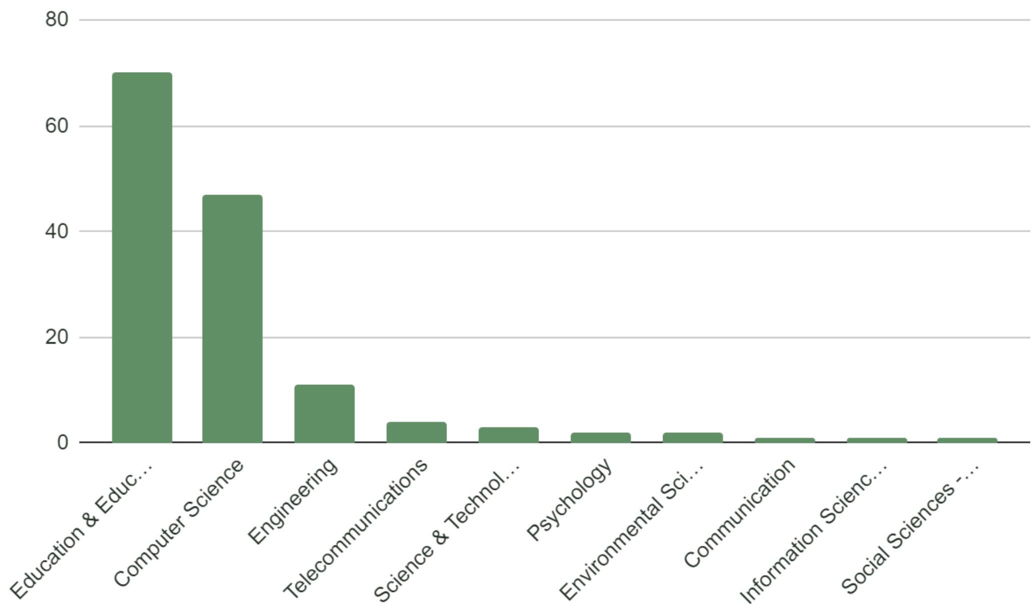
Distribution of studies according to document type and publication language



According to the distribution of studies by research area, "Education & Educational Research" with 70% and "Computer Science" with 47% came to the fore (Fig. 4).

Figure 4.

Distribution of Studies by Research Areas[1]



The WoS Core Category and Category Quartile information of publications (articles, reviews, and early view articles/reviews) examining learner participation in MOOC environments are given in Figure 5 and Figure 6. There are 45 papers with SSCI-indexed. According to the JIF values of the journals in this category, 73% of the studies are in the Q1 quartile. According to JCI values, 36 of the 45 papers with SSCI-indexed are in the Q1 quartile, while 4 of the 13 papers with E-SCI-indexed are in the Q1 quartile (See Figure 5). Accordingly, 68% of journals with a JCI value are in the Q1 quartile. According to the JIF and JCI quartiles distributions, most of the publications were published in more prestigious journals in terms of quality.

[1] In this way, the sum of the values does not coincide with the number of papers examined. The same paper was evaluated as an input in more than one research area.

Figure 5.

Distribution of publications by JIF category quartile[2]

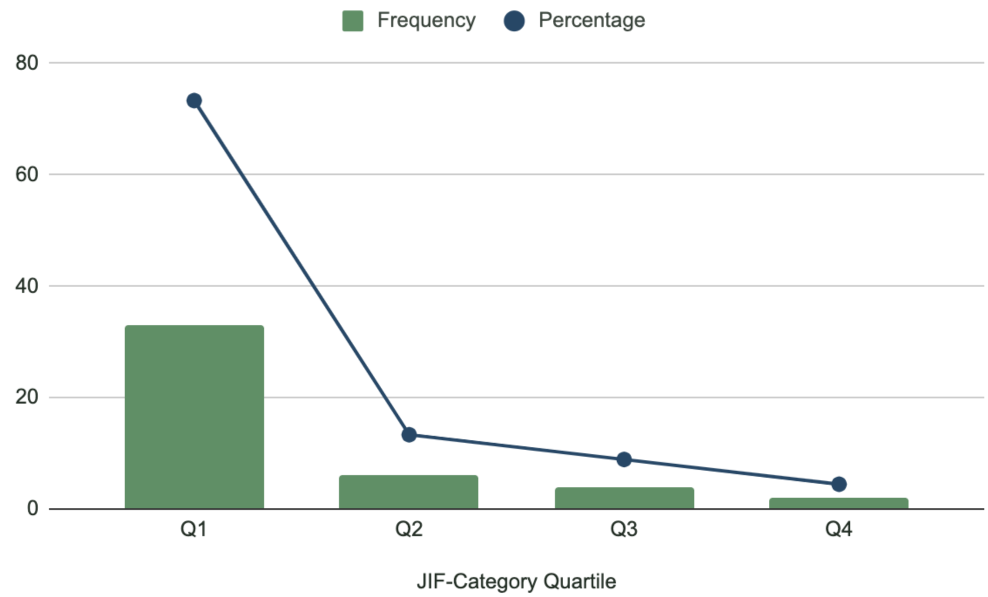
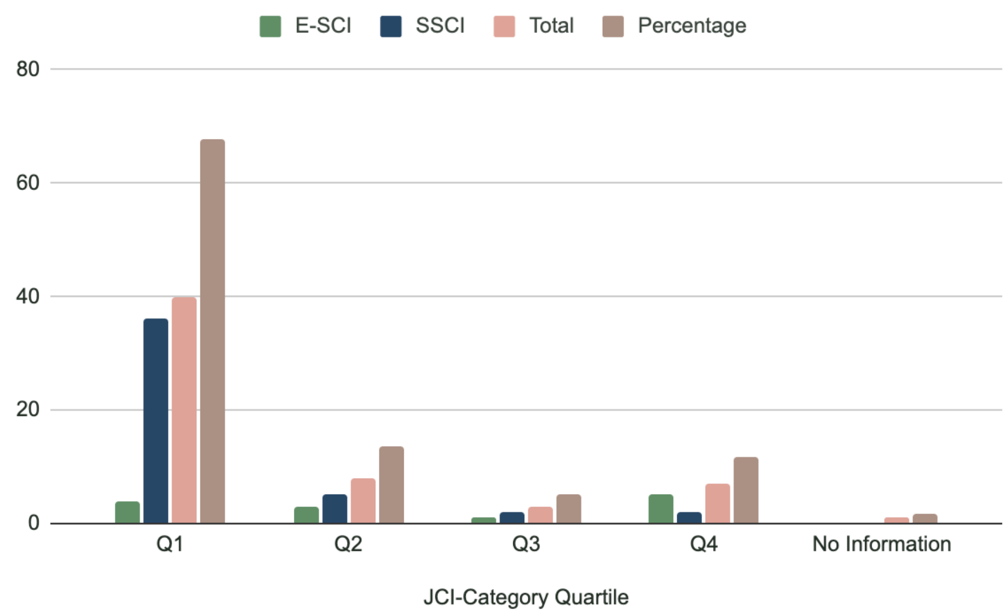


Figure 6.

Distribution of publications by JCI category quartile



Papers on learner engagement in MOOC settings have a mean JIF value of 4.88 and a median of 3.97 (Fig. 7). According to the JCI values, the average JCI value of the journal in the E-SCI index is .86, and the median is .69.

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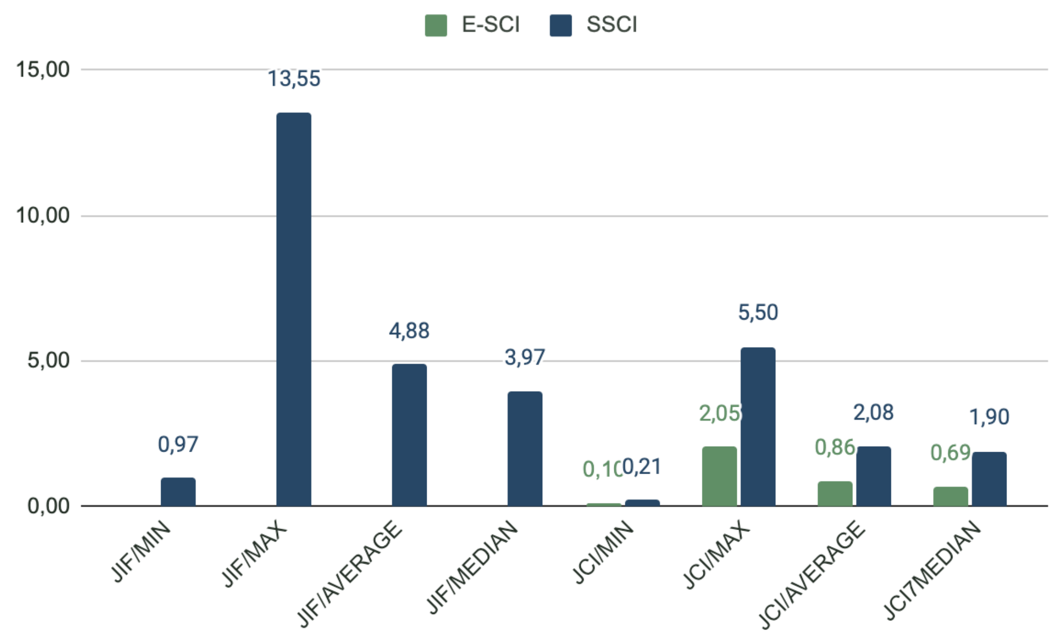
[2] We created Figure 4 using the total values in Appendix 1.

The JIF mean value is 4.88, and the median is 3.97. The average JCI value of those E-SCI-indexed journals is .86, and the median is .69. In SSCI-indexed journals, the average JCI value is 2.08, and the median is 1.90.

Figure 7.

Descriptive statistics for JCI and JIF values

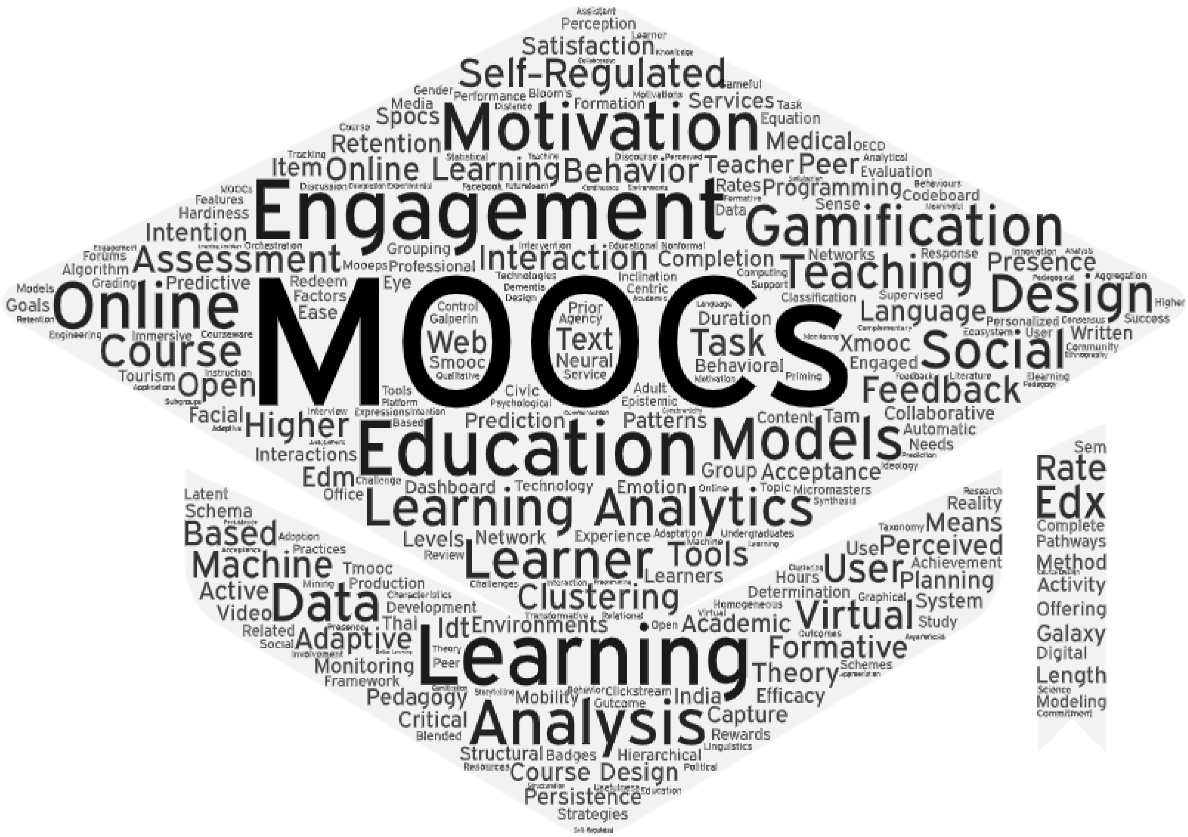


To identify trends in studies of student engagement in MOOC settings, we generated a word cloud using keywords from papers included in the review (Fig. 8). The prominent words or phrases in the word cloud created with the keywords in the papers included in the review are MOOCs[3], engagement[4], learning, education, learning analytics, motivation, analysis, learner, gamification.

[3] The keyword MOOC stands for MOOC, MOOCs, and Massive Open Online Course(s) words and phrases.
[4] The engagement keyword represents the words and phrases engagement, student engagement, and learner engagement.

Figure 8.

Keywords word cloud of studies indexed in WoS Core Collections on student engagement in MOOCs



3.1. Student engagement in MOOC settings: Intrinsic factors

Khalil & Ebner (2017) emphasize the significance of focusing on internal factors that will enable them to participate willingly in learning processes in MOOCs settings (Fig. 8). Indeed, Alharbi et al. (2020) suggested that new types of behavior and patterns are emerging in major online environments such as MOOCs. Motivation is one of the main factors in studies that discuss the aspects of individuals' behavior and goals in MOOCs settings (Hakami et al., 2017; Moore & Blackmon, 2022; Wu & Zhang, 2016). Indeed, motivation is the most prominent factor affecting student engagement in MOOCs settings (Fig. 9). Tang and Chaw (2019) reported that learner motivation in MOOC settings is positively related to engagement in the system and willingness to complete the course. Koukis and Jimoyiannis (2017) emphasize that motivation and peer interaction support provided in MOOCs improves student engagement. A motivated student can stay in the system longer and be more determined to complete the course she or he is involved in. Accordingly, students' intrinsic and extrinsic motivation has a crucial impact on MOOCs engagement (Liu et al., 2022).

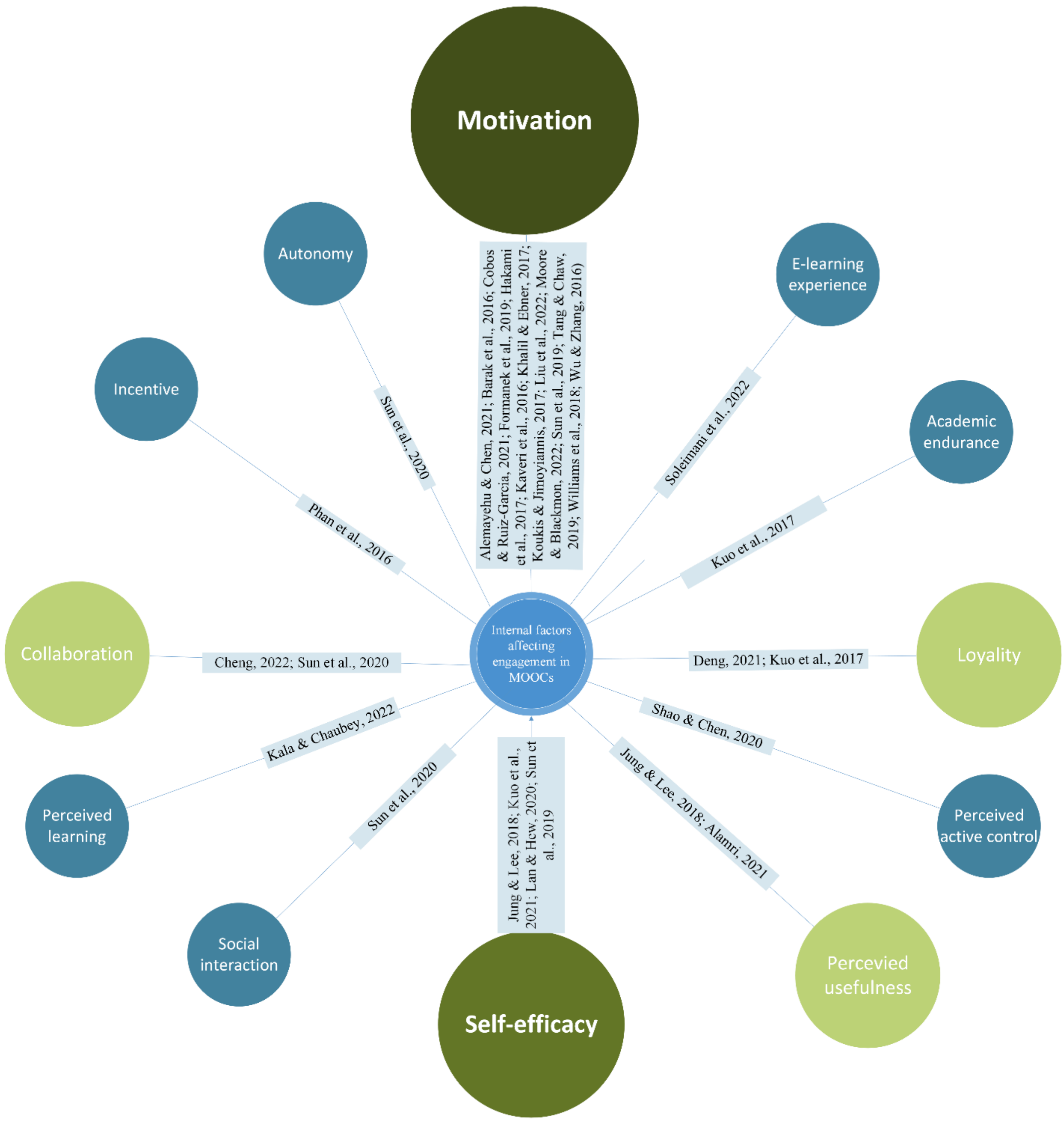
Self-efficacy is another crucial internal factor that directly affects student participation in MOOCs settings (Jung & Lee, 2018; Sun et al., 2019). In MOOCs settings, participants' perceptions of internet-based, perceived, and academic self-efficacy increase engagement (Alamri, 2022; Jung & Lee, 2018; Kuo et al., 2021; Lan & Hew, 2020). Indeed, Pérez-Alvarez et al. (2020) state that students who organize their learning and follow up on their work in MOOCs settings have a higher engagement. Kuo et al. (2021) stated that the sense of self-efficacy perceived in the system contributes to students' behavioral and affective engagement.

It is also essential to how the student perceives the system and the educational process. It is emphasized that active control, synchronicity, and two-way communication perceived in the online system are essential stimuli for individuals to continue and engage in the environment (Shao & Chen, 2020). In addition, students who are comfortable learning new things may be more involved in MOOCs settings (Kaveri et al., 2016). In a similar study, students' commitment to the system is one of the most important factors of academic resilience in MOOC environments, and this situation significantly affects student engagement (Kuo et al., 2017).

Among the internal factors, the attitude developed by the student towards the system and the process is also effective. Kala and Chaubey (2022) mentioned a strong relationship between perceived learning and student engagement in MOOCs settings. In addition, establishing an environment where students can express themselves freely in online environments has practical benefits in developing positive attitudes. Some studies suggest that students choosing how the path they attend the course in MOOCs settings will improve their engagement (Crosslin et al., 2018). In addition, it is stated that the quality of information, system quality, interaction, and cooperation perceived by the student in the system increase student satisfaction and engagement (Cheng, 2022).

Figure 9.

Internal factors affecting engagement in MOOCs

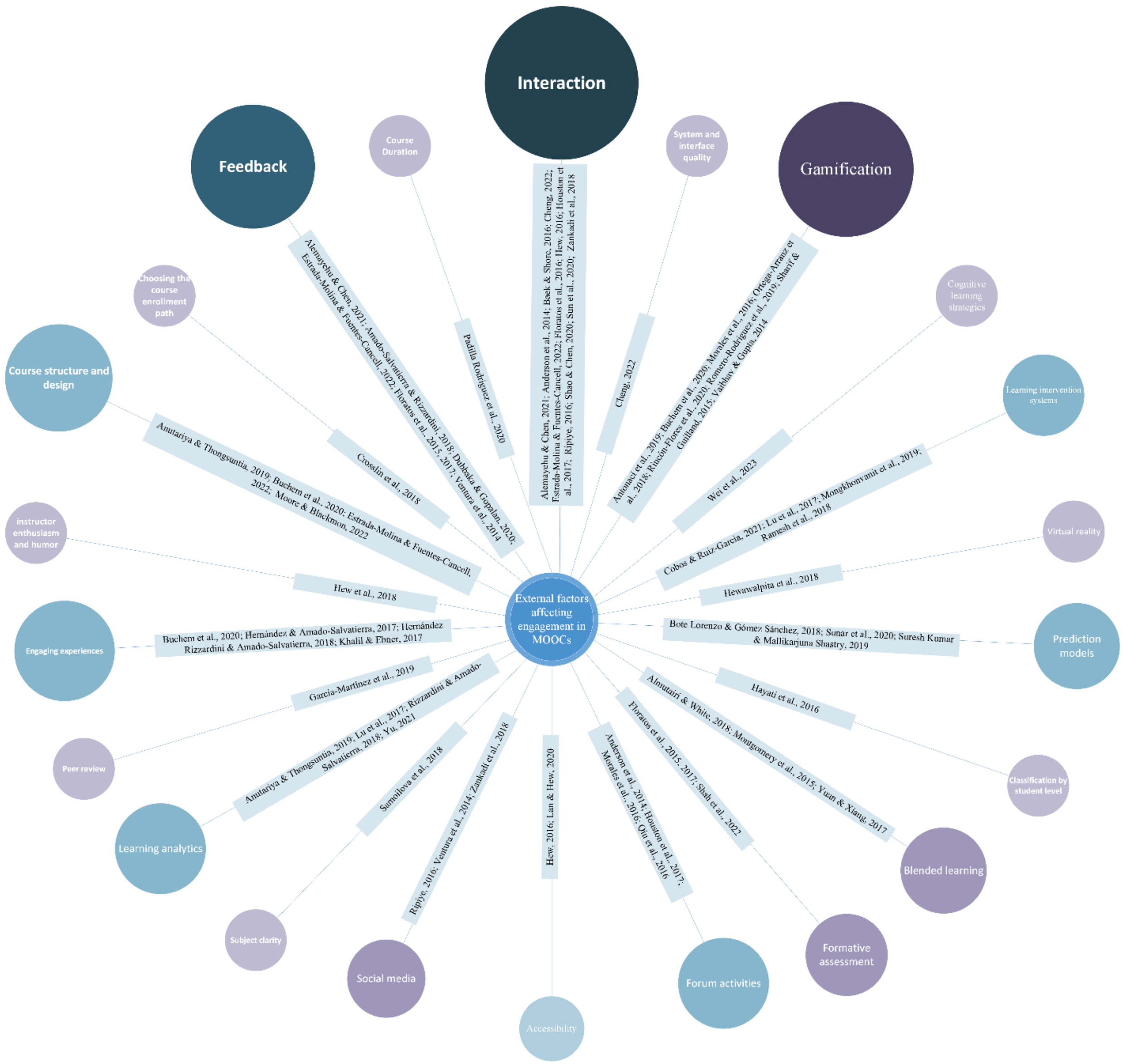


3.2. Student engagement in MOOCs settings: External factors

As in face-to-face learning environments, it affects student participation in online environments such as MOOCs, the instructor's ability to deliver the lesson in an enthusiastic and mise-en-scene structure (Hew et al., 2018), students' social interactions, and providing a collaborative learning environment (Sun et al., 2020) there are various exogenous factors (Fig. 10).

Figure 10.

Internal factors affecting engagement in MOOCs



As mentioned in the titles, various studies show that interaction positively affects student engagement (Alemayehu & Chen, 2021; Estrada-Molina & Fuentes-Cancell, 2022; Floratos et al., 2016; Hew, 2016; Ripiye, 2016; Sun et al., 2020). The fact that a MOOC environment is easily accessible and provides appropriate interaction opportunities supports students' active learning (Hew, 2016). In addition, there are various studies on the effect of social interaction and discussion environments in MOOC environments on student engagement and motivation (Crues et al., 2018; Ripiye, 2016). One of the places where social interaction is most intense today is undoubtedly social media platforms. It is argued that using social media components in MOOCs settings has a complementary effect and increases engagement (Zankadi et al., 2018). Floratos et al. (2016) argued that the most critical interaction in MOOCs settings is between the student and the platform. Goldberg et al. (2015) reported that students with low education levels participate more in discussion environments integrated into the environment and that the discussion environment has a highly significant relationship with the course completion rate. On the other hand, studies also focus on student-student interaction (Baek & Shore, 2016; Houston et al., 2017).

One of the other factors affecting student engagement in MOOCs settings is the gamification of the learning process. There are opinions that gamification ensures course engagement and student continuity throughout the course (Antonaci et al., 2019; Buchem et al., 2020; Morales et al., 2016; Ortega-Arranz et al., 2018; Sharif & Guilland, 2015; Vaibhav & Gupta, 2014). However, contrary to these views, Hagedorn et al. (2022) stated in their study that gamification in the MOOC environment caused a partial distraction in some students. However, it is seen in the literature that gamification strategies positively affect engagement and motivation in online environments (i.e., Rincón-Flores et al., 2020; Romero-Rodriguez et al., 2019). Technologies such as virtual reality may create opportunities for the future while determining and implicating gamification strategies. Indeed, Hewawalpita et al. (2018) concluded that students perform statistically better in MOOCs environments where content is presented using virtual reality.

The feedback mechanism's functionality is one-factor affecting student participation in MOOC settings (Dubbaka & Gopalan, 2020). It has been stated that feedback, student follow-up, and correction requests regarding student participation in these environments will increase participation rates (Amado-Salvatierra & Rizzardini, 2018; Dubbaka & Gopalan, 2020; Estrada-Molina & Fuentes-Cancell, 2022). The conditions for feedback and formative assessment in face-to-face settings also apply to MOOC settings in terms of improving student engagement (Floratos et al., 2015, 2017). Ventura et al. (2014) state that social media-supported feedback environments are essential for student feedback and active participation in MOOCs environments. Measuring and evaluating student engagement and success in online environments has also been important for researchers in the literature.

As in face-to-face learning environments, in MOOCs, regulations regarding course structure and design, such as the appropriate adjustment of content and course duration, support the student's behavioral, cognitive, and emotional readiness for learning. Indeed, Samoilova et al. (2018) stated that one of the strongest predictors of student engagement in MOOCs settings is the clarity of the topics in the content. One of the prominent suggestions regarding the presentation of content in these environments is that the short course duration is a factor that increases student retention and completion rate (Dubbaka & Gopalan, 2020; Padilla Rodriguez et al., 2020). Besides the organization of the content, the perceived usefulness or usability of MOOCs platforms is also an essential factor (Alamri, 2022).

Wei et al. (2023) stated that cognitive and metacognitive learning strategies used in MOOC environments positively affect motivation and participation. On the other hand, Lan and Hew (2020) concluded that behavioral adjustments made in MOOCs settings are effective in engagement and learning in this environment. In addition, it is known that the pre-test to be given to the students before the start of the course has positive learning outcomes and, therefore, student engagement (Sharma et al., 2015).

It has been emphasized in various studies that applications involving learning analytics intervention on MOOCs platforms have important outputs in terms of improving learning outcomes and student engagement and improving the environment (Lu et al., 2017; Rizzardini & Amado-Salvatierra, 2018; Sinclair & Kalvala, 2015; Yu, 2021). Learning analytics offers a variety of possibilities for these environments to evolve and personalize learning. Regarding a similar effort, the opinions about getting to know the student and classification are noteworthy. Indeed, Rodrigues et al. (2016) claimed that student engagement could be increased by performing cluster analysis in MOOC settings. Similarly, Bote Lorenzo and Gómez Sánchez (2018) argued that predictive models that can be applied to students who are included in the system to complete their tasks in the MOOCs settings would increase student participation. In addition, a performance analysis and behavior prediction method to be applied to students will identify students who may be at risk of dropping out of MOOCs (Suresh Kumar & Mallikarjuna Shastry, 2019) and develop intervention strategies. To prevent dropping out of MOOCs, Hayati et al. (2016) argued that classification by determining the levels of student engagement in MOOCs settings would enable various interventions.

4. Discussion and Conclusion

This study examines the general trends in the papers in the WoS Core Collection on student engagement in MOOCs settings and the factors that influence student engagement in these settings. According to the distribution of papers by year, the first studies on the subject belong to 2014, and most studies were published in 2018. In 2021, when we felt the impact of the pandemic intensely, the number of publications decreased significantly. More than half of the reviewed papers are article-type studies. A significant number of these articles are in the Q1 quartile for both JIF and JCI values. This result indicates that papers related to engagement in MOOCs settings in qualified journals are considered.

The concepts of learning analytics, motivation, and gamification draw attention to the word cloud prepared with the keywords of the papers examined. Learning analytics to examine the nature and structure of student engagement is an essential source of data in engagement studies. In addition, intervention programs using learning analytics have a substantial place in papers (i.e., Lu et al., 2017). In addition, learning motivation components and gamification are used in interventions to ensure and improve student engagement in these environments.

We examined which factors affect student engagement in MOOCs environments and what these factors are under two main headings: internal and external. According to the study's results, motivation is the most fundamental intrinsic factor associated with student engagement in MOOCs settings. The necessity of including exciting experiences at the beginning, middle, and end of the process in order to increase engagement in MOOC settings is emphasized in various studies (Hernández & Amado-Salvatierra, 2018a; 2018b). Another critical factor affecting participation is the perception of self-efficacy (i.e., academic self-efficacy, internet-based self-efficacy). Indeed, there is a significant relationship between academic self-efficacy and academic performance (i.e., Adeyemo, 2007; Choi, 2005; Honicke & Broadbent, 2016). Students with high academic self-efficacy tend to attend and engage in higher education in environments such as MOOCs with high levels of student autonomy (Breslow et al., 2013; Jung & lee, 2018). In terms of internal factors, collaboration and loyalty are other prominent factors in the development of student participation in MOOCs. The most prominent external factor in participation in MOOCs is interaction (i.e., Baek&shore,2016; Hew,2016; Sun et al.,2020; Koukis & Jimoyiannis,2017). The number and quality of interactions of students with each other or with the instructor affect student engagement and, therefore, student performance (Baek & Shore, 2016; Cheng, 2022). In online environments such as MOOCs, the student experiences a feeling of isolation, which is one of the main difficulties in distance education, and a decreased motivation to learn, and it is known that this situation leads to low student engagement (Alharbi et al., 2020). Interventions to improve learners' communication and interaction with other learners and instructors in MOOC settings will help the learner experience less isolation, which will support higher learning motivation and learner engagement. Gamification, one of the interventions aimed at improving the learner's interaction with the environment, is another crucial factor in terms of student engagement in these environments (Alharbi et al., 2020; Antonaci et al., 2019; Khalil et al., 2017; Morales et al., 2016; Vaibhav & Gupta, 2014). Papers involving gamification intervention show that these environments increase learner motivation and performance, as well as learner completion rates (i.e., Alharbi et al., 2020; Morales et al., 2016; Romero-Rodríguez et al., 2019).

One of the most notable indicators of instructor-learner interaction is feedback. Feedback is an essential element of learner engagement in online and face-to-face learning environments (Floratos et al., 2017). Providing feedback to large audiences in MOOC settings is a significant challenge for the educator(s). Various studies emphasize that this challenge can be overcome by providing appropriate feedback to learners through systems fueled by learning analytics, data mining, and machine learning methods (i.e., Amado-Salvatierra & Rizzardini, 2018). In addition, Dubbaka and Gopalan (2020) mentioned the importance of feedback to the trainer on learner engagement in MOOCs settings.

Course structure and design are critical factors for learners to continue and complete courses in MOOCs.The most prominent of the course structure components that will contribute to the improvement of student engagement in these environments is the duration of the course and the fact that each of the learning units offered in the course can be completed in a short time (Padilla Rodriguez et al., 2020) and the usefulness of these environments (Alamri, 2022). However, intelligent learning systems – structures that include learning analytics, data mining, and machine learning – have the potential to improve engagement and course dropout rates in online environments in terms of providing adaptive and profile-based learning experiences (Amado-Salvatierra & Rizzardini, 2018; Anutariya & Thongsuntia, 2019; Bote Lorenzo & Gómez Sánchez, 2018; Haysati et al., 2016; Rodrigues et al., 2016; Yu, 2021).

Ethical Declaration

We declare that we carry out all processes in this study in accordance with ethical principles.

Conflict Interest and Author Contributions

All stages of this study were carried out with the collaborative and equal contribution of both authors.

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Appendix 1. Detailed information on the articles in the reviewed Web of Science Master Journal List

Journal Title	WoS Index	Journal Impact Factor (2021)	JIF-Category Quartile	Journal Citation Indicator	JCI-Category Quartile	Article - Article; Early Access	Review - Review; Early Access	Total
COMPUTERS & EDUCATION	SSCI	11,182	Q1	3,75	Q1	7	1	8
BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY	SSCI	5,268	Q1	2,77	Q1	3		3
IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES	SSCI	4,433	Q1	1,39	Q1	3		3
JOURNAL OF COMPUTER ASSISTED LEARNING	SSCI	3,761	Q1	2,01	Q1	3		3
ETR&D-EDUCATIONAL TECHNOLOGY RESEARCH AND DEVELOPMENT	SSCI	5,58	Q1	2,85	Q1	2		2
INTERACTIVE LEARNING ENVIRONMENTS	SSCI	4,965	Q1	1,95	Q1	2	1	3
INTERNET AND HIGHER EDUCATION	SSCI	8,591	Q1	5,36	Q1	2		2
JOURNAL OF UNIVERSAL COMPUTER SCIENCE	SSCI	1,056	Q3	0,33	Q3	2		2
OPEN LEARNING	E-SCI	N/A	N/A	1,53	Q1	2		2
SUSTAINABILITY	SSCI	3,889	Q2	0,65	Q2	2		2
AUSTRALASIAN JOURNAL OF EDUCATIONAL TECHNOLOGY	SSCI	3,730	Q1	1,85	Q1	1		1
BEHAVIOUR & INFORMATION TECHNOLOGY	SSCI	3,320	Q2	0,60	Q2	1		1
BMC MEDICAL EDUCATION	SSCI	3,263	Q2	1,41	Q1	1		1
COMPUTER APPLICATIONS IN ENGINEERING EDUCATION	SSCI	2,109	Q3	0,64	Q2	1		1
COMPUTERS IN HUMAN BEHAVIOR	SSCI	8,957	Q1	2,59	Q1	1		1
COMUNICAR	SSCI	5,725	Q1	2,94	Q1		1	1
DISTANCE EDUCATION	SSCI	5,500	Q1	2,33	Q1	1		1
EDUCATIONAL SCIENCES-THEORY & PRACTICE	Not Indexed	N/A	N/A	N/A	N/A	1		1
ELECTRONIC JOURNAL OF E-LEARNING	E-SCI	N/A	N/A	2,05	Q2	1		1
IEEE ACCESS	SSCI	3,476	Q2	3,48	Q2	1		1

IEEE LATIN AMERICA TRANSACTIONS	SSCI	0,967	Q4	0,23	Q4	1		1
INTERACTIVE TECHNOLOGY AND SMART EDUCATION	E-SCI	N/A	N/A	1,31	Q1	1		1
INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE IN EDUCATION	E-SCI	N/A	N/A	0,58	Q4	1		1
INTERNATIONAL JOURNAL OF EDUCATIONAL TECHNOLOGY IN HIGHER EDUCATION	SSCI	7,611	Q1	3,25	Q1	1		1
INTERNATIONAL JOURNAL OF INTERACTIVE DESIGN AND MANUFACTURING - IJIDEM	E-SCI	N/A	N/A	0,42	Q3	1		1
INTERNATIONAL JOURNAL OF LEARNING TECHNOLOGY	E-SCI	N/A	N/A	0,30	Q4	1		1
INTERNATIONAL JOURNAL OF TECHNOLOGIES IN HIGHER EDUCATION	E-SCI	N/A	N/A	0,10	Q4	1		1
INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTRIBUTED LEARNING	SSCI	2,770	Q1	1,61	Q1	1		1
INTERNET RESEARCH	SSCI	6,353	Q1	1,43	Q1	1		1
JOURNAL OF COMPUTING IN HIGHER EDUCATION	SSCI	4,045	Q1	2,11	Q1	1		1
JOURNAL OF INFORMATION SCIENCE AND ENGINEERING	SSCI	1,142	Q4	0,21	Q4	1		1
JOURNAL OF INFORMATION TECHNOLOGY RESEARCH	E-SCI	N/A	N/A	0,18	Q4	1		1
JOURNAL OF RESEARCH ON TECHNOLOGY IN EDUCATION	SSCI	3,281	Q2	1,43	Q1	1		1
JOURNAL OF TEACHING IN TRAVEL & TOURISM	E-SCI	N/A	N/A	0,96	Q2	1		1
KULTURNO-ISTORICHESKAYA PSIKHOLOGIYA-CULTURAL-HISTORICAL PSYCHOLOGY	E-SCI	N/A	N/A	0,24	Q4	1		1
ONLINE LEARNING	E-SCI	N/A	N/A	1,83	Q1	1		1
OPEN PRAXIS	E-SCI	N/A	N/A	0,80	Q2	1		1
PHYSICAL REVIEW PHYSICS EDUCATION RESEARCH	SSCI	2,359	Q3	1,43	Q1	1		1
REVIEW OF EDUCATIONAL RESEARCH	SSCI	13,551	Q1	5,53	Q1	1		1
Total						**56**	**3**	**59**

Appendix 2. Papers included in the review

#	Paper Title	Pub. Year	Author(s)	Publication
1.	Promoting student engagement in MOOCs	2016	J. Baek and J. Shore	Proceedings of the Third (2016) ACM Conference on Learning@ Scale
2.	Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCS	2016	K. F. Hew	British Journal of Educational Technology
3.	Will MOOCs transform learning and teaching in higher education? Engagement and course retention in online learning provision	2015	S. I. De Freitas, J. Morgan and D. Gibson	British journal of educational technology
4.	Learning engagement and persistence in massive open online courses (MOOCS)	2018	Y. Jung and J. Lee	Computers & Education
5.	Applying learning analytics for improving students engagement and learning outcomes in an MOOCs enabled collaborative programming course	2017	O. H. Lu, J. C. Huang, A. Y. Huang and S. J. Yang	Interactive Learning Environments
6.	Clustering patterns of engagement in Massive Open Online Courses (MOOCs): the use of learning analytics to reveal student categories	2017	M. Khalil and M. Ebner	Journal of computing in higher education
7.	Learner engagement in MOOCs: Scale development and validation	2020	R. Deng, P. Benckendorff and D. Gannaway	British Journal of Educational Technology
8.	Learning through engagement: MOOCs as an emergent form of provision	2016	S. Walji, A. Deacon, J. Small and L. Czerniewicz	Distance Education
9.	Gamification of MOOCs for increasing user engagement	2014	A. Vaibhav and P. Gupta	2014 IEEE International Conference on MOOC, Innovation and Technology in Education (MITE)
10.	Understanding students' engagement in MOOCs: An integration of self-determination theory and theory of relationship quality	2019	Y. Sun, L. Ni, Y. Zhao, X. L. Shen and N. Wang	British Journal of Educational Technology
11.	Engagement and retention in VET MOOCs and online courses: A systematic review of literature from 2013 to 2017	2018	R. M. Paton, A. E. Fluck and J. D. Scanlan	Computers & Education
12.	Gamification in MOOCs: Engagement application test in energy sustainability courses	2019	L. M. Romero-Rodriguez, M. S. Ramirez-Montoya and J. R. V. González	IEEE Access 2019
13.	Blending for student engagement: Lessons learned for MOOCs and beyond	2015	A. P. Montgomery, D. V. Hayward, W. Dunn, M. Carbonaro and C. G. Amrhein	Australasian Journal of Educational Technology
14.	Understanding student engagement in large-scale open online courses: A machine learning facilitated analysis of student's reflections in 18 highly rated MOOCs	2018	K. F. Hew, C. Qiao and Y. Tang	International Review of Research in Open and Distributed Learning
15.	Examining learning engagement in MOOCs: A self-determination theoretical perspective using mixed method	2020	M. Lan and K. F. Hew	International Journal of Educational Technology in Higher Education
16.	Understanding the determinants of learner engagement in MOOCs: An adaptive structuration perspective	2020	Y. Sun, Y. Guo and Y. Zhao	Computers & Education
17.	The civic mission of MOOCs: Measuring engagement across political differences in forums	2016	J. Reich, B. Stewart, K. Mavon and D. Tingley	Proceedings of the Third (2016) ACM Conference on Learning@ Scale
18.	Linking web-based learning self-efficacy and learning engagement in MOOCs: The role of online academic hardiness	2021	T. M. Kuo, C.-C. Tsai and J.-C. Wang	The Internet and Higher Education
19.	Recommendations on Formative Assessment and Feedback Practices for stronger engagement in MOOCs	2015	N. Floratos, T. Guasch and A. Espasa	Open Praxis 2015
20.	Examination of relationships among technology acceptance, student engagement, and perceived learning on tourism-related MOOCs	2019	D. Kala and D. S. Chaubey	Journal of Teaching in Travel & Tourism

21.	Pass the idea please: The relationship between network position, direct engagement, and course performance in MOOCs	2017	S. L. Houston, K. Brady, G. Narasimham and D. Fisher	Proceedings of the fourth (2017) ACM conference on learning@ scale
22.	Understanding individuals' engagement and continuance intention of MOOCs: the effect of interactivity and the role of gender	2020	Z. Shao and K. Chen	Internet Research 2020
23.	Improving learner engagement in MOOCs using a learning intervention system: A research study in engineering education	2021	R. Cobos and J. C. Ruiz-Garcia	Computer Applications in Engineering Education 2021
24.	Gamification of MOOCs adopting social presence and sense of community to increase user's engagement: An experimental study	2019	A. Antonaci, R. Klemke, J. Lataster, K. Kreijns and M. Specht	European Conference on Technology Enhanced Learning
25.	Driving high inclination to complete massive open online courses (MOOCs): motivation and engagement factors for learners	2019	C. M. Tang and L. Chaw	Electronic Journal of e-Learning
26.	Applying learning analytics to deconstruct user engagement by using log data of MOOCs	2018	M.-C. Liu, C.-H. Yu, J. Wu, A.-C. Liu and H.-M. Chen	Journal of Information Science & Engineering
27.	Refocusing the lens on engagement in MOOCs	2018	R. W. Crues, N. Bosch, M. Perry, L. Angrave, N. Shaik and S. Bhat	Proceedings of the fifth annual ACM conference on learning at scale
28.	Designing MOOCs for teacher professional development: Analysis of participants' engagement and perceptions	2017	N. Koukis and A. Jimoyiannis	European Conference on e-Learning
29.	Analysis of the impact of social feedback on written production and student engagement in Language MOOCs	2014	P. Ventura, E. Bárcena and E. Martín-Monje	Procedia-Social and Behavioral Sciences
30.	Investigating Students' Adoption of MOOCs during COVID-19 Pandemic: Students' Academic Self-Efficacy, Learning Engagement, and Learning Persistence	2022	M. M. Alamri	Sustainability 2022
31.	Learner and instructor-related challenges for learners' engagement in MOOCs: A review of 2014–2020 publications in selected SSCI indexed journals	2021	L. Alemayehu and H.-L. Chen	Interactive Learning Environments
32.	Characterizing learners' engagement in MOOCs: an observational case study using the NoteMyProgress tool for supporting self-regulation	2020	R. A. Pérez-Álvarez, J. Maldonado-Mahauad, K. Sharma, D. Sapunar-Opazo and M. Pérez-Sanagustín	IEEE Transactions on Learning Technologies
33.	Gamification: a new key for enhancing engagement in MOOCs on energy?	2020	E. G. Rincón-Flores, J. Mena and M. S. R. Montoya	International Journal on Interactive Design and Manufacturing (IJIDeM)
34.	Learner engagement, retention and success: why size matters in massive open online courses (MOOCs)	2020	B. C. Padilla Rodriguez, A. Armellini and M. C. Rodriguez Nieto	Open Learning: The Journal of Open, Distance and e-Learning
35.	Detecting learner engagement in MOOCs using automatic facial expression recognition	2020	A. Dubbaka and A. Gopalan	2020 IEEE Global Engineering Education Conference (EDUCON)
36.	The civic mission of MOOCs: Engagement across political differences in online forums	2018	M. Yeomans, B. M. Stewart, K. Mavon, A. Kindel, D. Tingley and J. Reich	International journal of artificial intelligence in education
37.	Which quality determinants cause MOOCs continuance intention? A hybrid extending the expectation-confirmation model with learning engagement and information systems success	2022	Y.-M. Cheng	Library Hi Tech
38.	Deep knowledge tracing and engagement with moocs	2019	Mongkhonvanit, K., Kanopka, K., & Lang, D	Proceedings of the 9th international conference on learning analytics & knowledge

39.	Correlation analysis between expectancy-value and achievement goals in MOOCs on energy sustainability: profiles with higher engagement	2020	L. M. Romero-Rodríguez, M. S. Ramírez-Montoya and J. R. V. González	Interactive Technology and Smart Education
40.	Construction of learning behavioral engagement model for MOOCs platform based on data analysis	2018	G. Sun and S. Bin	Educational Sciences: Theory & Practice
41.	In-depth exploration of engagement patterns in MOOCs	2018	L. Shi and A. I. Cristea	International conference on web information systems engineering
42.	Decoding engagement in MOOCs: an indian learner perspective	2016	A. Kaveri, S. Gunasekar, D. Gupta and M. Pratap	2016 IEEE Eighth International Conference on Technology for Education
43.	Understanding the role of learner engagement in determining MOOCs satisfaction: A self-determination theory perspective	2022	Y. Liu, M. Zhang, D. Qi and Y. Zhang	Interactive Learning Environments
44.	The different relationships between engagement and outcomes across participant subgroups in massive open online courses	2018	Q. Li and R. Baker	Computers & Education
45.	Analyzing learners' engagement and behavior in MOOCs on programming with the Codeboard IDE	2020	J. M. Gallego-Romero, C. Alario-Hoyos, I. Estévez-Ayres and C. Delgado Kloos	Educational Technology Research and Development
46.	Meaningful gamification in MOOCs. Designing and examining learner engagement in the Open Virtual Mobility Learning Hub	2020	I. Buchem, C. Carlino, F. Amenduni and A. Poce	Proceedings of the 14th International Technology, Education and Development Conference
47.	Interpretable engagement models for MOOCs using Hinge-loss markov random fields	2018	A. Ramesh, D. Goldwasser, B. Huang, H. Daume and L. Getoor	IEEE Transactions on Learning Technologies
48.	Why learners fail in MOOCs? Investigating the interplay of online academic hardiness and learning engagement among MOOCs learners	2017	T. M. L. Kuo, C. C. Tsai and J. C. Wang	25th International Conference on Computers in Education, ICCE
49.	Examining the impacts of social media engagement on learners motivation in MOOCs	2016	P.-R. Ripiye	European Conference on e-Learning
50.	Do learners share the same perceived learning outcomes in MOOCs? Identifying the role of motivation, perceived learning support, learning engagement, and self-regulated learning strategies	2023	X. Wei, N. Saab and W. Admiraal	The Internet and Higher Education
51.	The effects of assessment design on academic dishonesty, learner engagement, and certification rates in MOOCs	2022	G. Alexandron, M. E. Wiltrout, A. Berg, S. a. K. Gershon and J. A. Ruipérez-Valiente	Journal of Computer Assisted Learning
52.	Storified Programming MOOCs: A Case Study on Learner Engagement and Perception	2022	C. Hagedorn, E.-S. Betz and C. Meinel	2022 IEEE Global Engineering Education Conference (EDUCON)
53.	Data-Driven analysis of engagement in gamified learning environments: A methodology for real-time measurement of MOOCs	2020	K. Alharbi, L. Alrajhi, A. I. Cristea, I. I. Bittencourt, S. Isotani and A. James	International Conference on Intelligent Tutoring Systems 2020
54.	Integrating survey and learning analytics data for a better understanding of engagement in MOOCs	2018	E. Samoilova, F. Keusch and F. Kreuter	Data analytics and psychometrics: informing assessment practices. Information Age Publishing, Charlotte
55.	What factors ınfluence learner engagement wıth futurelearn moocs? A case study from bath	2017	F. Casson, M. Salter and M. Hejmadi	EDULEARN17 Proceedings
56.	Student engagement ın moocs wıth approprıate formatıve assessment and feedback practıces	2017	N. Floratos, T. Guasch and A. Espasa	EDULEARN17 Proceedings
57.	Students' Engagement and Learning Process in Non-Language Focused MOOCs for EFL Purpose	2017	Z. Yuan and H. Xiang	2017 International Conference on Education, Economics and Management Research (ICEEMR 2017)
58.	Is student engagement hıgher ın moocs wıth approprıate formatıve assessment and feedback practıces?	2016	N. Floratos, T. Guasch and A. Espasa	9th Annual International Conference of Education, Research and Innovation 2016
59.	Learners'engagement and perceptıon ın orıental moocs and spocs contexts	2015	Y.-C. Lai, S. Young and N.-F. Huang	EDULEARN15 Proceedings
60.	Virtually unlimited classrooms: Pedagogical practices in massive open online courses	2015	B. Toven-Lindsey, R. A. Rhoads and J. B. Lozano	The internet and higher education 2015

61.	A literature review on MOOCs integrated with learning analytics	2021	Z. Yu	Journal of Information Technology Research (JITR)
62.	A practical experience on the use of gamification in MOOC courses as a strategy to increase motivation	2016	M. Morales, H. R. Amado-Salvatierra, R. Hernández, J. Pirker and C. Gütl	International Workshop on Learning Technology for Education Challenges 2016
63.	An adaptive learning approach using a full engagement educational framework	2017	R. Hernández and H. R. Amado-Salvatierra	International Conference on P2P, Parallel, Grid, Cloud and Internet Computing 2017
64.	An approach to build in situ models for the prediction of the decrease of academic engagement indicators in Massive Open Online Courses	2018	M. L. Bote Lorenzo and E. Gómez Sánchez	Journal of Universal Computer Science
65.	Towards full engagement for open online education. A practical experience from MicroMasters at edX	2018	R. H. Rizzardini and H. R. Amado-Salvatierra	In: Software Data Engineering for Network eLearning Environments
66.	Analysis of student engagement and course completion in massive open online courses	2019	S. Suresh Kumar and P. Mallikarjuna Shastry	In: Integrated Intelligent Computing, Communication and Security
67.	Analyzing learners engagement in a micromasters program compared to non-degree MOOC	2022	F. Soleimani, J. Lee and M. Yilmaz Soylu	Journal of Research on Technology in Education 2022
68.	Behavior and Intention in MOOCs Research	2016	B. Wu and C. Zhang	2016 2nd International Conference on Artificial Intelligence and Industrial Engineering (AIIE 2016)
69.	Classification system of learners engagement within Massive Open Online Courses	2016	H. Hayati, J. S. Tahiri, M. K. Idrissi and S. Bennani	4th IEEE International Colloquium on Information Science and Technology (CiSt) 2016
70.	Creating collaborative groups in a MOOC: a homogeneous engagement grouping approach	2019	L. Sanz-Martinez, E. Er, A. Martínez-Monés, Y. Dimitriadis and M. L. Bote-Lorenzo	Behaviour & Information Technology 2019
71.	Creating engaging experiences in MOOCs through in-course redeemable rewards	2018	A. Ortega-Arranz, M. Kalz and A. Martínez-Monés	IEEE Global Engineering Education Conference (EDUCON) 2018
72.	Discovery engagement patterns MOOCs through cluster analysis	2016	R. L. Rodrigues, J. L. C. Ramos, J. C. S. Silva and A. S. Gomes	IEEE Latin America Transactions 2016
73.	Effective Learning Content Offering in MOOCs with Virtual Reality-An Exploratory Study on Learner Experience	2018	S. Hewawalpita, S. Herath, I. Perera and D. Meedeniya	J. Univers. Comput. Sci. 2018
74.	Emotionally engaged learners are more satisfied with online courses	2021	R. Deng	Sustainability 2021
75.	Engagement and Desertion in MOOCs: Systematic Review	2022	O. Estrada-Molina and D.-R. Fuentes-Cancell	Comunicar: Media Education Research Journal 2022
76.	Engagement in Learning in the Massive Open Online Course: Implications for Epistemic Practices and Development of Transformative Digital Agency with Pre- and In-Service Teachers in Norway	2020	I. Engeness and M. Nohr	Cultural-Historical Psychology 2020.
77.	Engagement measures in massive open online courses	2015	J. Sinclair and S. Kalvala	International Workshop on Learning Technology for Education in Cloud 2015
78.	Engaging with massive online courses	2014	A. Anderson, D. Huttenlocher, J. Kleinberg and J. Leskovec	Proceedings of the 23rd international conference on World wide web 2014
79.	Examining student characteristics, goals, and engagement in Massive Open Online Courses	2018	K. M. Williams, R. E. Stafford, S. B. Corliss and E. D. Reilly	Computers & Education 2018
80.	Exploring new ways to increase engagement in full-path MOOC programs	2018	R. Hernández Rizzardini and H. R. Amado-Salvatierra	International Conference on Learning and Collaboration Technologies 2018
81.	Facebook and moocs: a comparative analysis for a collaborative learning	2018	H. Zankadi, I. Hilal, N. Daoudi and A. Idrissi	6th International Conference on Multimedia Computing and Systems (ICMCS) 2018
82.	From the Learner's perspective: A systematic review of MOOC learner experiences (2008–2021)	2022	R. L. Moore and S. J. Blackmon	Computers & Education 2022

83.	How do we model learning at scale? A systematic review of research on MOOCs	2018	S. Joksimović, O. Poquet, V. Kovanović, N. Dowell, C. Mills, D. Gašević, et al.	Review of Educational Research 2018
84.	How to measure student engagement in the context of blended-MOOC	2018	F. Almutairi and S. White	Interactive Technology and Smart Education 2018
85.	iLTI-QAT: A Model to Orchestrate Interaction Sessions in Hybrid MOOCs	2018	D. Nettikadan, L. V. Ngeze, H. Sukhathankar and J. M. Warriem	IEEE Tenth International Conference on Technology for Education (T4E) 2018
86.	Improving essay peer grading accuracy in massive open online courses using personalized weights from student's engagement and performance	2019	C. García-Martínez, R. Cerezo, M. Bermúdez and C. Romero	Journal of Computer Assisted Learning 2019
87.	Learner-centric MOOC model: a pedagogical design model towards active learner participation and higher completion rates	2022	V. Shah, S. Murthy, J. Warriem, S. Sahasrabudhe, G. Banerjee and S. Iyer	Educational technology research and development
88.	Massive Open Online Courses-Promoting Engagement Through Means of Gamification	2015	M. Sharif and A. Guilland	EDULEARN15 Proceedings 2015
89.	Modeling and predicting learning behavior in MOOCs	2016	J. Qiu, J. Tang, T. X. Liu, J. Gong, C. Zhang, Q. Zhang, et al.	Proceedings of the ninth ACM international conference on web search and data mining 2016
90.	Modelling MOOC learners' social behaviours	2020	A. S. Sunar, R. A. Abbasi, H. C. Davis, S. White and N. R. Aljohani	Computers in Human Behavior 2020
91.	MOOC design and learners engagement analysis: a learning analytics approach	2019	C. Anutariya and W. Thongsuntia	International Conference on Sustainable Information Engineering and Technology (SIET) 2019
92.	Motivation to learn in massive open online courses: Examining aspects of language and social engagement	2016	M. Barak, A. Watted and H. Haick	Computers & Education 2016
93.	Motivational factors that influence the use of MOOCs: learners' perspectives-a systematic literature review	2017	N. Hakami, S. White and S. Chakaveh	International Conference on Computer Supported Education 2017
94.	Relationship between learners' motivation and course engagement in an astronomy massive open online course	2019	M. Formanek, S. Buxner, C. Impey and M. Wenger	Physical Review Physics Education Research 2019
95.	Relationship between participants' level of education and engagement in their completion of the Understanding Dementia Massive Open Online Course	2015	L. R. Goldberg, E. Bell, C. King, C. O'Mara, F. McInerney, A. Robinson, et al.	BMC medical education 2015
96.	Shaping learners' attention in massive open online courses	2015	K. Sharma, D. Caballero, H. Verma, P. Jermann and P. Dillenbourg	International Journal of Technologies in Higher Education 2015
97.	Students' patterns of engagement and course performance in a Massive Open Online Course	2016	T. Phan, S. G. McNeil and B. R. Robin	Computers & Education 2016
98.				
99.	The Dependence Of Massıve Open Onlıne Courses'engagement Rate On Learners Support Models	2020	D. Maslova, G. Mozhaeva, K. Yakovleva and T. Kabanova	Proceedings of INTED2020 Conference 2nd-4th March 2020
100.	Customizable Modalities for Individualized Learning: Examining Patterns of Engagement in Dual-Layer MOOCs.	2018	Crosslin, M., Dellinger, J. T., Joksimovic, S., Kovanovic, V., & Gaševic, D.	Online Learning
101.	An Experience Using Educational Data Mining and Machine Learning Towards a Full Engagement Educational Framework	2018	H. R. Amado-Salvatierra and R. H. Rizzardini	International Workshop on Learning Technology for Education in Cloud 2018