Available online at www.ijournalse.org

Emerging Science Journal

(ISSN: 2610-9182)

Vol. 8, Special Issue, 2024

"Current Issues, Trends, and New Ideas in Education"

Review Article

The Impact of Motivation on MOOC Retention Rates: A Systematic Review

Zakaria Alj [1*], Anas Bouayad [1]

[1] *Faculty of Sciences, Sidi Mohamed Ben Abdellah University, Fez, Morocco.*

Abstract

This systematic review investigates the effectiveness of motivational strategies on learner engagement and retention rates in Massive Open Online Courses (MOOCs). Adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, we analyzed 140 studies published between 2014 and 2023 from key academic databases. The objective was to identify and evaluate motivational strategies that significantly reduce MOOC dropout rates. Our findings reveal that personalized learning, interactive content, and peer collaboration are strongly correlated with increased learner engagement and persistence. These strategies align well with learners' intrinsic goals, enhancing their educational experience and adherence to courses. The review also identifies gaps, such as the need for longitudinal studies and culturally tailored motivational strategies, offering a refined agenda for future research in MOOC education. This study contributes to the field by systematically synthesizing existing research, providing new insights into effective educational strategies, and highlighting areas for improvement in MOOC design and implementation.

Keywords:

MOOC; Dropout; Motivation; Engagement; Review; Design.

Article History:

Received:	27	February	2024
Revised:	26	May	2024
Accepted:	18	June	2024
Published:	09	July	2024

1- Introduction

The digital revolution has significantly reshaped the landscape of online education, notably through the advent of Massive Open Online Courses (MOOCs). These platforms, which offer expansive educational content, support ongoing development, and facilitate lifelong learning, have been widely adopted across the globe [1]. However, despite their potential, MOOCs are challenged by persistently high dropout rates, with completion rates fluctuating between 3% and 15% [2, 3]. This alarming trend highlights an urgent need for comprehensive research to understand and mitigate the factors contributing to such high attrition.

Since 2016, the academic focus on MOOC dropout rates has intensified, with numerous studies dissecting the causes and proposing effective countermeasures. Research has identified two primary categories of factors influencing dropout rates: learner-focused and MOOC-related. Learner-focused factors include insufficient motivation, time constraints, inadequate prior knowledge, and a disconnect with the course material, while MOOC-related factors often involve course structure, feelings of isolation, limited interaction, and unforeseen costs [4, 5]. Despite identifying these critical factors, many studies have not delved deeply into specific motivational drivers or proposed detailed strategies for addressing these dropout determinants. Furthermore, comprehensive studies by Goopio & Cheung (2020) [6] identified unclear course design, restricted interaction, and language proficiency as significant barriers to learner persistence. However, these analyses often lack a nuanced exploration of how motivational theories can be systematically applied to enhance course design and learner engagement.

* **CONTACT**: zakaria.alj@usmba.ac.ma

DOI: http://dx.doi.org/10.28991/ESJ-2024-SIED1-08

Despite the growing body of research, there remains a significant gap in understanding the specific motivational factors that encourage continued engagement in MOOCs. Prior studies have predominantly focused on identifying broad thematic issues but often fall short of operationalizing how motivational elements can be systematically leveraged to enhance learner retention [7–10]. Moreover, while motivation is frequently cited as a key determinant of learner retention, most studies have employed quantitative methods that may not fully capture the complex interplay of motivational factors within the MOOC context [10, 11]. These studies provide a foundation but do not sufficiently explore the application of motivational theories to practical MOOC design, a gap our research aims to fill.

This systematic review aims to bridge these gaps by offering a focused examination of motivation in MOOCs. Unlike previous research, our approach is not only to identify the factors influencing motivation but also to explore how these factors can be strategically implemented within the design and delivery of MOOCs to optimize learner engagement and success. We address our research questions through the PICOC criteria (Population, Intervention, Comparison, Outcome, Context):

Q1: *What are the fundamental factors that influence learner motivation in the context of MOOCs?*

Q2: *Which theoretical frameworks underpin the practical strategies for enhancing motivation and retention in MOOCs? How can these frameworks guide effective implementation?*

Q3: *What are the limitations or challenges associated with the implementation of these motivational strategies in MOOCs?*

Our review aims to provide actionable insights for MOOC designers, instructors, and researchers, with the goal of enhancing the effectiveness of MOOCs and reducing dropout rates. By deeply understanding the motivational factors contributing to learner retention, we can develop targeted interventions and strategies that significantly improve both learner outcomes and overall satisfaction with online learning experiences.

In accordance with the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) 2020 guidelines, our systematic review will detail the search strategy, selection criteria for studies, data extraction methods, and quality assessment processes in the Methods section. The Results section will present our findings, followed by a Discussion section where the implications of these results will be analyzed, limitations acknowledged, and future research directions suggested [12]. By uniquely applying motivational theories to the practical aspects of MOOC design and learner engagement, our study distinctively contributes to the literature and addresses critical gaps in understanding how to effectively reduce MOOC dropout rates.

2- Review Methodology

The objective of this systematic review is to explore and evaluate the existing literature for essential motivational factors and theories that influence participant retention in MOOCs. Through successful screening, extraction, and quality assessment of data from pertinent literature, crucial elements of motivational factors, engagement components, and theories were identified. Although not a meta-analysis, this systematic review adhered to the PRISMA 2020 guidelines for the selection process.

2-1- Inclusion and Exclusion Criteria

In this systematic review, we have established specific inclusion and exclusion criteria to ensure that the selected studies are relevant and contribute to a comprehensive understanding of the research questions. The inclusion criteria are designed to identify suitable studies that meet certain requirements, while the exclusion criteria are in place to filter out studies that do not contribute meaningfully to the analysis. The following are the detailed inclusion and exclusion criteria for this review:

Inclusion Criteria

(1) Studies written in English or French.

(2) The period was restricted to publications from 1 January 2013 to 31 March 2023 to include the most recent publications.

(3) This review imposed no limitations on research settings or populations and embraced all research methodologies, including quantitative, qualitative, and mixed-methods approaches.

(4) Peer-reviewed publications.

(5) Gray literature, although it might not be peer-reviewed, it can still offer valuable and trustworthy information.

(6) Studies specifically focused on motivation in MOOCs.

(7) At least eight pages in length.

(8) Directly addressing learner motivation in MOOCs

(9) Should not duplicate the same concept by the same authors.

Exclusion Criteria

(1) Studies with similar contributions by the same authors.

(2) Studies not written in English or French.

(3) Blog entries, magazine articles, dissertations, newsletters.

(4) Published articles that were not peer-reviewed except grey literature.

(5) Studies that exhibited unclear or inadequate findings, as they failed to offer reliable information pertinent to the research questions.

2-2- Review Design

This systematic review examines the role of motivation in MOOC retention by identifying influential motivational factors, theories, and elements influencing participant retention. The focus is specifically on understanding motivation within the context of MOOCs, rather than comprehensively analyzing all possible factors and theories in other educational contexts. In this regard, this systematic review employs a mixed-methods design for evaluating quantitative and qualitative articles, enabling a comprehensive exploration of the chosen approach. A mixed-methods review facilitates examining interdisciplinary data on motivation components linked with MOOC retention. The design further uncovers various outcomes, including quantitative changes in ratings and self-reported insights into satisfaction, motivation, and dropout reduction.

A wide range of literature, including gray literature, was reviewed according to the predetermined inclusion/exclusion criteria. The selection principles were established before the search and applied to verify the relevance and validity of the data by setting normative standards for the content and purpose of the studies. The online databases used in this systematic review included Google Scholar, Scopus, Web of Science, ERIC, PsycINFO, and ProQuest. The search strategy incorporated keywords related to motivation, MOOC, dropout, participation, and review. A snowball approach was also employed to identify and review gray literature from sources such as the International Society for Technology in Education (ISTE) and Edutopia.org.

2-3- Search strategy

The search results were filtered by the publication date, including articles within the timeframe of January 1st, 2013 to March 31, 2023. The search strategy was based on the PICOC criteria, utilizing keywords with Boolean values and abbreviations. Specifically, keywords such as "motivat*", "MOOC", "dropout", "participat*", "retention", "intrinsic motivation", "extrinsic motivation", and "theories" were used to identify relevant literature, while keywords like "econom*" were employed to exclude any unrelated topics. Figure 1 provides an overview of the process and the results.

The first phase involved a search using the keywords "Motivation" and "MOOC". This search identified 750 potential articles. After reviewing 300 abstracts, 120 articles were selected for further examination. The second phase of the search was more detailed, aiming to refine the results from the first phase. The keywords used in this phase included "motivation", "online learning", "engagement", "dropout", "retention", "participation", "attrition", and " intrinsic/ extrinsic motivation ". This search identified 453 articles. After analyzing 120 abstracts, 70 articles were shortlisted for the review. The third phase was the most comprehensive and specifically targeted the research questions. The search resulted in a pool of 11041 articles. After analyzing abstracts, 372 articles were marked for further analysis.

After the three search phases, a total of 562 articles (120 from the first search, 70 from the second, and 372 from the third) were selected for further screening. During this process, 67 articles were removed due to issues identified during codification.

Of the remaining 495 articles, they were thoroughly analyzed and 355 were removed, as they did not meet the established selection criteria. The remaining 140 articles were selected for the review.

This search strategy was iterative, starting with a wide scope and gradually becoming more focused with each subsequent phase. The strategy aimed to be comprehensive, ensuring that all potential literature was considered. The screening and analysis processes were rigorous, ensuring that only the most relevant and high-quality articles were included in the final review. The search process diagram is presented in Figure 1 below.

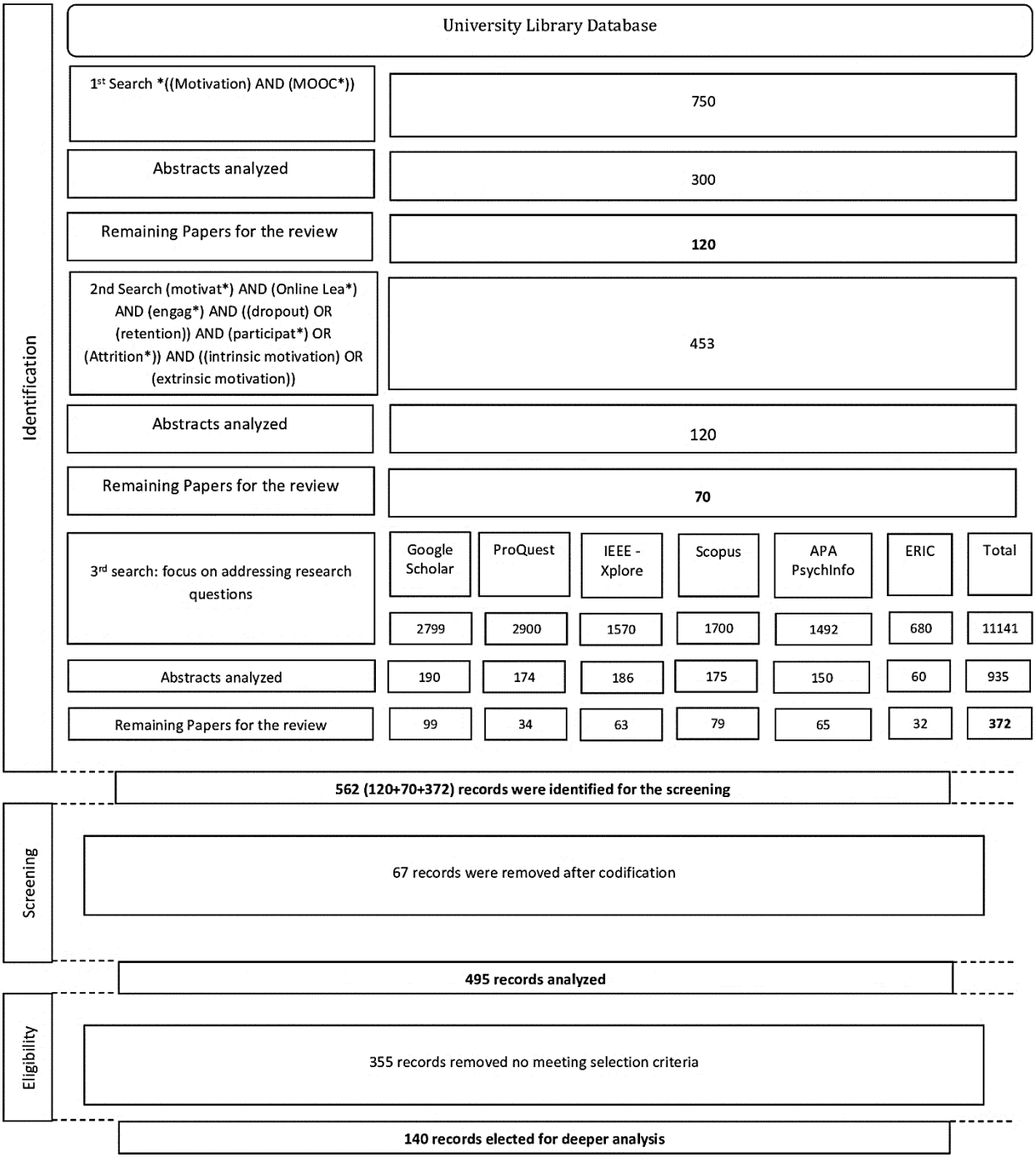

Figure 1. Search Process Diagram

2-4- Quality Appraisal

In the initial stage, two researchers with backgrounds in educational technology (Coder 1: a Ph.D. student researcher in Education and Learning Sciences; Coder 2: a Dr in educational technology) screened the selected articles to eliminate duplications and exclude those not relevant or outside the scope of the review. They used three criteria for the critical appraisal: (1) relevance based on the title and abstract, (2) explicit results, consequences, and proof tied to the research inquiries, and (3) omission of articles concerning software, coding, and technical aspects, with emphasis solely on those with educational ramifications.

To reduce bias and address concerns about the reliability and validity of The Mixed Methods Appraisal Tool (MMAT), the review researcher clarified some of the criteria utilized in the MMAT for obtaining additional objective scores in selected articles. Other researchers analyzed and categorized the studies using the identical inclusion and exclusion guidelines. They evaluated each study's relevance, delving into the complete text of the papers when required. The level of concurrence between the coders was determined using the kappa coefficient, which came out to be 76%, signifying a considerable degree of agreement.

The researcher autonomously extracted data from the final list of articles that fulfilled the predefined criteria. Data regarding study design, intervention duration, participant information, data collection, and intervention outcomes were recorded. The two authors resolved disagreements during the settlement, with a third author resolving disagreements if necessary. Despite the paucity of consensus in the literature regarding the MMAT's reliability, this technique has been examined for reliability and content validity, and the team made efforts to ensure a thorough and unbiased review process.

2-5- Data Analysis

Upon identifying the relevant articles and completing data extraction, the research team carried out a meticulous analysis of the gathered data. This analysis comprised the following steps:

Categorization: The studies were sorted based on their emphasis on specific motivational factors, target population, MOOC environment, and engagement. This categorization enabled the team to discern patterns and trends in the role of motivation and engagement in MOOCs.

Thematic analysis: The research team performed a thematic analysis to pinpoint common themes and trends arising from the studies. This entailed coding each study's findings and assembling them into broader themes. Each researcher independently undertook the coding process, followed by a discussion to agree on the final themes.

Comparative analysis: The team juxtaposed the outcomes of studies examining similar motivational factors, theories, or engagement aspects to comprehend the consistency of the findings across diverse studies. This allowed the researchers to determine the generalizability of the results and identify areas where the findings might be contradictory or inconclusive.

Synthesis and interpretation: Ultimately, the research team integrated the findings from the categorization, thematic analysis, and comparative analysis to draw conclusions about the role of motivation and engagement in MOOC retention, and how these factors and theories can be harnessed to encourage course completion. The team also recognized potential limitations and areas for future research based on the reviewed studies. By adhering to this thorough data analysis process, the research team aimed to offer an extensive understanding of the current state of research on motivation and engagement in MOOCs, and their influence on student retention and dropout rates.

Table 1. Articles selected for the review

Authors	Year	Journal/Conference
Abdullatif et al. [13]	2020	Education and Information Technologies
Aldowah et al. [5]	2019	Journal of Computing in Higher Education
Alario-Hoyos et al. [14]	2017	The International Review of Research in Open and Distributed Learning
Alraimi et al. [15]	2015	Computers and Education
Barak et al. [16]	2016	Computers and Education
Bayeck et al. [17]	2016	Open Praxis
Bonk and Lee [18]	2017	Journal of Learning for Development
Brooker et al. [19]	2018	Australasian Journal of Educational Technology
Buhr et al. [20]	2019	Computers in Human Behavior
Carrera & Ramirez-Hernandez [21]	2018	Sustainability
Reparaz et al. [22]	2020	Computers in Human Behavior
Chang et al. [23]	2015	British Journal of Educational Technology
Deshpande & Chukhlomin [24]	2017	American Journal of Distance Education
Doo et al. [25]	2020	Distance Education
El Said [26]	2017	Journal of Educational Computing Research
Eriksson et al. [27]	2017	Journal of Computing in Higher Education
Moreira-Mora & Espinoza-Guzmán [28]	2016	International Journal of Educational Technology in Higher Education
Gomez-Zermeno et al. [29]	2016	Turkish Online Journal of Distance Education
Greene et al. [30]	2015	American Educational Research Journal
Gregori et al. [31]	2019	Computers and Education
Hone & El Said [32]	2016	Computers and Education
Howarth et al. [33]	2016	International Journal of Lifelong Education
James [34]	2022	Journal of College Student Retention: Research, Theory and Practice

Joo et al. [35]	2018	Computers and Education
Jung & Lee [36]	2018	Computers and Education
Khan et al. [37]	2018	Telematics and Informatics
Kim et al. [38]	2017	Computers in Human Behavior
Kyewski & Kramer [39]	2018	Computers and Education
Li et al. [40]	2018	Computers in Human Behavior
Luik et al. [41]	2017	British Journal of Educational Technology
Maya-Jariego et al. [42]	2020	Educational Technology Research and Development
Ortega-Arranz et al. [43]	2019	Computers and Education
Petronzi & Hadi [44]	2016	European Journal of Open, Distance and E-learning
Salmon et al. [45]	2017	British Journal of Educational Technology
Shao [46]	2018	Internet Research
Shapiro et al. [47]	2017	Computers and Education
Sujatha & Kavitha [48]	2018	International Journal of Education and Development Using ICT
Sun et al. [49]	2019	British Journal of Educational Technology
Chaw & Tang [50]	2019	Electronic Journal of e-Learning
Tsai et al. [51]	2018	Computers and Education
Uchidiuno et al. [52]	2018	International Journal of Artificial Intelligence in Education
Wang & Baker [53]	2015	Journal of Online Learning and Teaching
Wang & Baker [54]	2018	The International Review of Research in Open and Distributed Learning
Wang et al. [11]	2016	Behavior and Information Technology
Watted & Barak [55]	2018	The Internet and Higher Education
Wu & Chen [56]	2017	Computers in Human Behavior
Xing et al. [57]	2016	The Internet and Higher Education
Xiong et al. [8]	2015	Global Education Review
Zhou [58]	2016	Computers and Education
Zhao et al. [59]	2020	Computers and Education
Alharbi et al. [60]	2020	Lecture Notes in Computer Science
Antonaci et al. [61]	2019	Lecture Notes in Computer Science
Anutariya & Thongsuntia [62]	2019	Proceedings of the International Conference on Sustainable Information Engineering and Technology (SIET)
Appiah-Kubi & Rowland [63]	2016	Proceedings of the 3rd ACM Conference on Learning @ Scale
Baek & Shore [64]	2016	Proceedings of the 3rd ACM Conference on Learning@Scale
Balasooriya et al. [65]	2018	Communications in Computer and Information Science
Bonafini et al. [66]	2017	Online Learning
Borras-Gené et al. [67]	2019	Informatics
Bote-Lorenzo & Gomez-Sánchez [68]	2017	Proceedings of the 7th International Learning Analytics & Knowledge Conference
Brady et al. [69]	2016	Proceedings of the 3rd ACM Conference on Learning @ Scale
Brunskill et al. [70]	2018	Proceedings of the 5th Annual ACM Conference on Learning at Scale
Cassidy et al. [71]	2014	All Ireland Journal of Teaching and Learning in Higher Education
Chang & Wei [72]	2016	Educational Technology & Society
Chen et al. [73]	2016	Proceedings of the 8th ACM Conference on Web Science
Coetzee et al. [74]	2014	Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing
Coffrin et al. [75]	2014	Proceedings of the 4th International Conference on Learning Analytics and Knowledge - LAK '14
Cook et al. [76]	2015	Proceedings of the THETA: The Higher Education Technology Agenda Conference
Crosslin et al. [77]	2018	Online Learning
Crues et al. [78]	2018	Proceedings of the 5th Annual ACM Conference on Learning at Scale
Davis et al. [79]	2017	Proceedings of the 7th International Learning Analytics & Knowledge Conference
de Freitas et al. [80]	2015	British Journal of Educational Technology
Deng et al. [81]	2020	British Journal of Educational Technology
Deng et al. [82]	2020	Journal of Computer Assisted Learning

Dubbaka & Gopalan [83]	2020	Proceedings of the IEEE Global Engineering Education Conference (EDUCON)
Ferguson & Clow [84]	2016	Journal of Learning Analytics
Ferguson & Clow [85]	2015	Proceedings of the 5th International Conference on Learning Analytics and Knowledge
Ferguson et al. [86]	2015	Lecture Notes in Computer Science
Floratos et al. [87]	2015	Open Praxis
Gallego-Romero et al. [88]	2020	Educational Technology Research and Development
Goldberg et al. [89]	2015	BMC Medical Education
Gong et al. [90]	2019	Proceedings of the 7th International Conference on Information and Education Technology
Guo et al. [91]	2014	Proceedings of the 1st ACM Conference on Learning @ Scale Conference
Hew [92]	2016	British Journal of Educational Technology
Houston et al. [93]	2017	Proceedings of the 4th ACM Conference on Learning @ Scale
Hu et al. [94]	2020	Proceedings of the 10th International Conference on Learning Analytics & Knowledge
Huang et al. [95]	2014	Proceedings of the 1st ACM Conference on Learning @ Scale Conference
Kaveri et al. [96]	2016	Proceedings of the IEEE 8th International Conference on Technology for Education
Khalil et al. [97]	2017	Proceedings of the 11th European Conference on Games Based Learning
Kizilcec et al. [98]	2017	Proceedings of the 4th ACM Conference on Learning @ Scale
Labarthe et al. [99]	2016	Proceedings of the 9th International Conference on Educational Data Mining
Min & Foon [100]	2019	Proceedings of the 4th International Conference on Distance Education and Learning
Lan & Hew [101]	2020	International Journal of Educational Technology in Higher Education
Bozkurt & Keefer [102]	2017	Interactive Learning Environments
Lu et al. [103]	2017	Interactive Learning Environments
Milligan et al. [104]	2013	Journal of Online Learning and Teaching
Nelimarkka & Hellas [105]	2018	Proceedings of the 49th ACM Technical Symposium on Computer Science Education
Núnez et al. [106]	2014	Proceedings of the 2nd International Conference on Technological Ecosystems for Enhancing Multiculturality
Phan et al. [107]	2016	Computers and Education
Qiu et al. [108]	2016	Proceedings of the 9th ACM International Conference on Web Search and Data Mining
Ramesh et al. [109]	2020	IEEE Transactions on Learning Technologies
Sharif & Guilland [110]	2015	Proceedings of EDULEARN15 Conference
Shi & Cristea [111]	2018	Lecture Notes in Computer Science
Sun & Bin [112]	2018	Educational Sciences: Theory and Practice
Sunar et al. [113]	2017	IEEE Transactions on Learning Technologies
Thaker et al. [114]	2019	Proceedings of the 9th International Conference on Learning Analytics & Knowledge
Thornton et al. [115]	2017	Proceedings of the 4th ACM Conference on Learning @ Scale
Vaibhav & Gupta [116]	2014	Proceedings of the IEEE International Conference on MOOC, Innovation and Technology in Education
Walji et al. [117]	2016	Distance Education
Wang et al. [11]	2016	Proceedings of the 6th International Conference on Learning Analytics & Knowledge
Wen & Rosé [118]	2014	Proceedings of the 23rd ACM International Conference on Conference on Information and Knowledge Management
Wen et al. [119]	2019	Proceedings of the World Wide Web Conference on WWW '19
Williams et al. [120]	2018	Computers and Education
Wise [121]	2018	Contemporary Technologies in Education
Wong et al. [122]	2016	Proceedings of the CHI Conference Extended Abstracts on Human Factors in Computing Systems
Xiao & Wang [123]	2016	Proceedings of the 18th ACM International Conference on Multimodal Interaction
Xing et al. [57]	2016	Proceedings of the SIGGRAPH ASIA 2016 Symposium on Education
Zheng et al. [124]	2016	Proceedings of the 3rd ACM Conference on Learning @ Scale
Zheng et al. [125]	2015	Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing
Badali et al. [126]	2022	Research and Practice in Technology Enhanced Learning
Moore et al. [127]	2021	Computers & Education
Semenova et al. [128]	2022	The Journal of Open, Distance and e-Learning
Xu et al. [129]	2022	In Proceedings of the 14th International Conference on Education Technology and Computers

Estrada-Molina et al. [130]	2022	Media Education Research Journal
Nleme Ze & Molinari [131]	2022	Distance and Mediation of Knowledge (French)
Kuo et al. [132]	2021	The Internet and Higher Education
Pérez-Sanagustín et al. [133]	2021	Computer Applications in Engineering Education
Goopio & Cheung (2020) [6]	2021	Journal of Teaching in Travel & Tourism
Vázquez et al. [134]	2021	Educational Media International
Rohan et al. [135]	2021	IEEE Access
Shao & Chen [136]	2021	Internet Research
Cobos et al. [137]	2021	Computer Applications in Engineering Education
Meekers et al. [138]	2022	Distance and Mediation of Knowledge (French)
Borrella et al. [139]	2022	Computers & Education
Schettino & Capone [140]	2022	International Journal of Environmental Research and Public Health
Yu et al. [141]	2022	Interactive Learning Environments
Romero-Frias et al. [142]	2023	Interactive Learning Environments
Wei et al. [143]	2023	The Internet and Higher Education
Huang et al. [144]	2023	Computers & Education
Vezne et al. [145]	2023	Education and Information Technologies
Cheng et al. [146]	2023	Social Science Computer Review

Table 1 presents a comprehensive list of the 140 collection of academic researches selected for the review. Notably, there is a larger representation of conference proceedings, with 89 entries, as compared to the 51 journal articles. This disparity might indicate that the issue of dropout rates in MOOCs and the impact of motivation is of great importance, prompting researchers to frequently present their findings at conferences for quicker dissemination and discussion of their work. The substantial number of conference proceedings suggests that the academic community is highly engaged in addressing this critical concern, actively exploring new ideas, fostering collaboration, and staying informed of the latest advancements in understanding and addressing the challenges of dropout rates, motivation, and engagement in MOOCs.

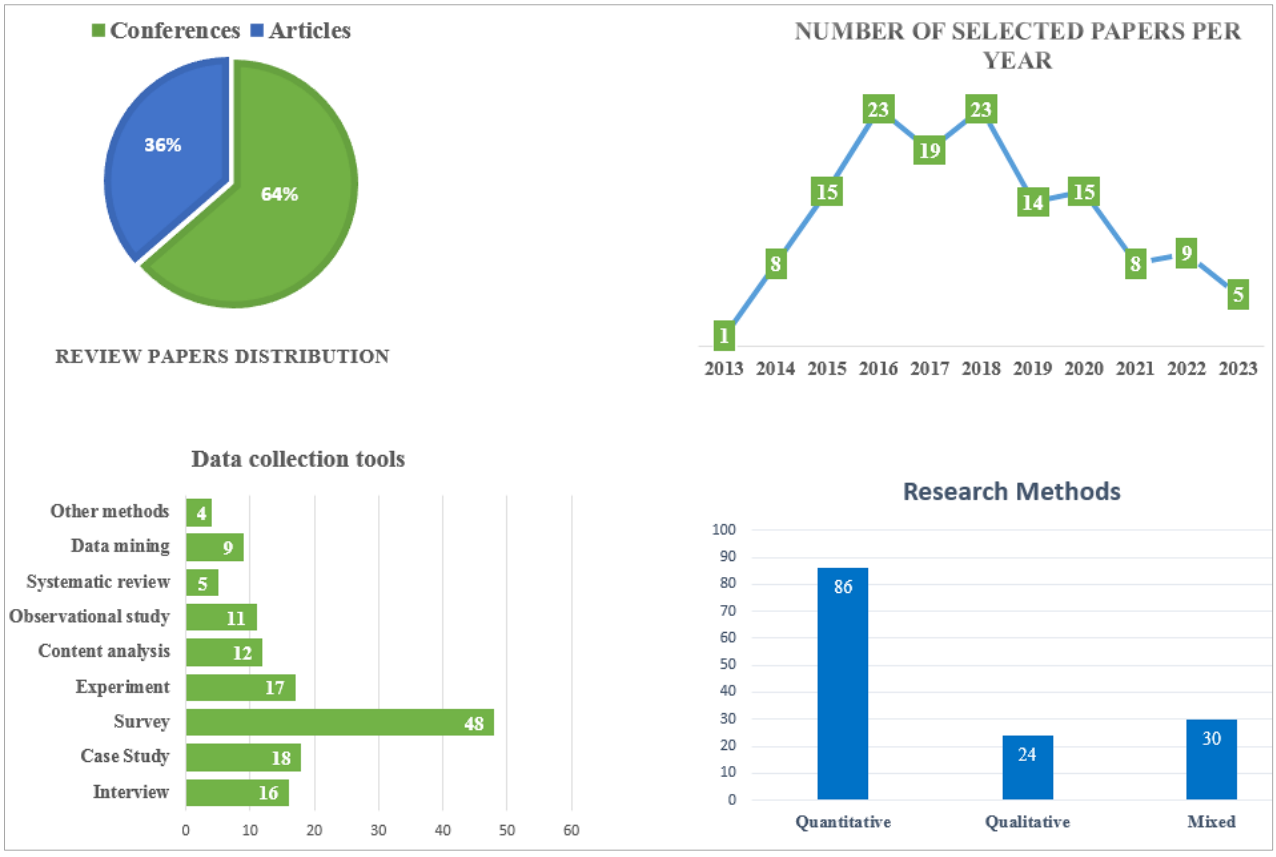

Figure 2. Statistic of reviewed Papers

As noticed in the first paragraph of the introduction, the number of articles published on the topic of MOOC dropout increased significantly in 2016, indicating a growing interest of researchers in this subject. However, it is important to note that the decrease in the number of articles published in the following years does not necessarily mean that the topic has become less important. It is possible that some articles were not selected for the systematic review because the ideas they presented had already been studied before. Additionally, the decrease in the number of articles published may reflect a saturation of research on this topic rather than a decrease in researchers' interest.

Upon analyzing the data, it is evident that the majority of the articles employ quantitative method, with the survey approach being the most frequently used. This highlights a preference for gathering structured, numerical data across various research contexts. Meanwhile, qualitative methods offer in-depth investigations through case studies and interviews. Mixed methods (30 articles) combine the strengths of both approaches to provide comprehensive insights. This variety of methodologies suggests a diverse range of research designs and objectives within the reviewed articles.

Following the methodology section, the next section in the research review is the results section. In this section, we present and summarize the key findings from the analyzed articles. By synthesizing the outcomes of the various methodologies, including quantitative, qualitative, and mixed methods approaches, we aim to provide a comprehensive understanding of the research topic. The results are organized and discussed according to the specific research questions or objectives that guided the review, allowing for a clear and coherent presentation of the significant findings and their implications. This section serves as the foundation for the subsequent discussion and conclusion sections, where the findings are further interpreted, and recommendations for future research are provided.

3- Results

Q1: *What are the fundamental factors and theoretical frameworks that influence learner motivation in the context of MOOCs?*

3-1- Motivation Factors

In order to comprehensively analyze the factors that influence MOOC completion rates, it is crucial to examine the diverse motivational sources that drive learners to complete courses. Based on the literature reviewed, these sources can be broadly categorized into two types: need-based and interest-based motivations [44]. Need-based motivations encompass academic, course-specific, and professional drivers, while interest-based motivations include personal, social, and technology-related factors, as illustrated in Table 2. In the following section, we will delve into these distinct categories of motivations and their impact on MOOC completion, drawing upon the selected articles for this review.

Table 2. Overview of motivation categories and types influencing MOOC completion

Motivation Category	Motivation Type	Example Studies
Need-based	Academic	- Jung & Lee (2018) [36] - Shao (2018) [46] - Wang & Baker (2018) [54] - Moore & Wang (2021) [127] - Semenova et al (2022) [128] - Nleme Ze & Molinari (2022) [131]
	Course	- James (2022) [34] - Reparaz et al. (2020) [22] - Aldowah et al. (2019) [5] - Kuo et al. (2021) [132] - Pérez-Sanagustín et al. (2021) [133] - Vázquez et al. (2021) [134]
	Professional	- Doo et al. (2020) [25] - Shao & Chen (2021) [136] - Cobos & Ruiz-Garcia (2021) [137] - Meekers et al. (2022) [138]
Interest-based	Personal	- Buhr et al. (2019) [20] - Borrella et al. (2022) [139] - Schettino & Capone (2022) [140] - Yu et al. (2022) [141]
	Social	- Gregori et al. (2018) [31] - Khan et al. (2018) [37] - Romero-Frías et al. (2023) [142] - Wei et al. (2023) [143] - Huang et al. (2023) [144]
	Technology-related	- Joo et al. (2018) [35] - Vezne et al. (2023) [145] - Cheng et al (2023) [146]

Need-based motivation refers to the concept that learners willingly engage in learning activities to meet their specific educational needs. This form of motivation, according to need-based theories, is shaped not only by external influences but also more importantly by internal drivers. These internal motivations can take the form of academic, course, and professional incentives. Collectively, these motivate learners to acknowledge and fulfill their educational needs, thus driving their learning journeys further.

Academic motivation: Academic motivation, which characterizes students' zeal towards their academic pursuits, plays a pivotal role in determining their academic success. Students with higher academic motivation often achieve more in their academic fields, while those with lesser motivation struggle with academic challenges. This motivation is influenced by a variety of factors. For instance, academic self-efficacy, as studied by Jung & Lee (2018) [36], Shao (2018) [46], and Wang & Baker (2018) [54], is a key determinant. The use of innovative pedagogical instruments, such as flipped classrooms, gamification, and query-based learning, also contributes to academic motivation as observed in studies by Chang et al. (2015) [23], Carrera & Ramírez-Hernández (2018) [21], and Ortega-Arranz et al. (2019) [43]. Moreover, the quest for further knowledge and learning skills, the aspiration to earn certificates or credits, and the influence of the teaching presence factor into this motivation. There are also intrinsic motivators such as goal orientation, grit, perceived reputation, self-improvement, and the freedom to learn. Other elements like previous bad experiences in a subject, English proficiency, value learning, and the learning environment design also come into play. It is worth noting that academic motivation has been linked to MOOC retention, and it plays a crucial role in overall learning engagement and perseverance, making it a prime area of interest for educators and researchers alike.

Course motivation: Course motivation is a key factor in learner engagement and retention in MOOCs, is largely contingent upon the structure, design, and content of the course. The complexity and difficulty of the course material, as suggested by James (2020) [34], can significantly sway a student's decision to continue or disengage from MOOCs. Moreover, factors such as course timing, highlighted by Kizilcec & Halawa (2015) [147], can impact completion rates; longer courses tend to have higher dropout rates. The perceived efficacy of the course content also plays a crucial role in student retention, as noted by Reparaz et al. (2020) [22] and supported by Alario-Hoyos et al. (2017) [14], with task value being a significant variable in this context. Other elements such as course relatedness to the program, learner's social situation, task value, and interest also contribute to course motivation. Furthermore, the design of the course, emphasized by Eriksson et al. (2017) [27], Aldowah et al. (2019) [5], and El Said (2017) [26], significantly impacts dropout rates, reinforcing the need for high-quality course materials and design. Factors like autonomy, sense of scarcity, and learner's perception of the course design and content are also of consequence. Thus, course motivation emerges as a multi-faceted concept, influenced by an array of factors tied to the course structure, content, and learner perception.

Professional motivation: Professional motivation is a key aspect driving individuals to engage with and complete MOOCs, often stemming from a desire to enhance their career prospects and job-related competencies. As highlighted in studies by Milligan & Littlejohn (2017) [148], MOOCs offer an avenue for learners to acquire novel knowledge and skills, thereby fueling their occupational development. The literature, including works by Doo et al. (2020) [25], Bayeck et al. (2016) [17], and Xiong et al. (2015) [8], underscores the importance of professional development needs as significant motivators for MOOC users. Furthermore, many individuals choose MOOCs due to their relevance to their current job or profession, a finding echoed in the research by Lu et al. (2017) [102], which pointed to a strong correlation between course relevancy and learner satisfaction. Additional professional motives influencing MOOCs retention include work circumstances [5, 47], workplace knowledge and experience [30, 44] , and economic mobility [27, 52]. In sum, professional motivation in the context of MOOCs is a complex construct shaped by various career-related factors and aspirations.

One significant motivation for individuals to enroll and learn from MOOCs is interest-based motivation. Research has shown that interest can be a strong motivator for learning, which arises as individuals interact with their learning environment. Studies have identified two types of interest that affect motivation: personal and situational interests. Personal interests relate to the individual's intrinsic interests and social motives, while situational interests are associated with technological motives.

Personal motivation: Personal motives refer to an individual's unique reasons for enrolling in a MOOC, play a crucial role in influencing the decision to complete or abandon these courses. This form of motivation encapsulates a myriad of factors including internal motivations, curiosity, personal growth, self-enjoyment, perceived value, and prior experiences, as outlined in research by Bonk & Lee (2017) [18], Aldowah et al. (2019) [5], and Watted & Barak (2018) [55] among others. The role of personal interest, boredom, and other personal reasons also significantly sway learners' decisions, as indicated by Petronzi & Hadi (2016) [44], Buhr et al. (2019) [20], and Shao (2018) [46]. Despite the limited influence of certifications on MOOCs retention identified by Wang & Baker (2015) [53], personal motives consistently emerge as a pivotal factor in course completion as emphasized by Kizilcec & Halawa (2015) [147]. Additionally, social motivations, involving aspects such as social support, interactions, and the social presence observed by Gregori et al. (2019) [31] and Khan et al. (2018) [37], complement these personal motives and further impact MOOC participation and completion.

Social motivation: Social motivations, essentially our innate desire to connect and interact with others, are a substantial determinant in the decision to engage with and complete MOOCs. This spectrum of motivation encapsulates elements such as social support, the presence of friends in a course, opportunities for networking, and the chance to meet new people, as highlighted by Aldowah et al. (2019) [5], Gregori et al. (2019) [31], and Uchidiuno et al. (2018) [52]. Additionally, the influence of social norms, the potential for social mobility, and the value of communication and information use cannot be understated, as they shape the social dynamics within MOOCs. According to research by Khan et al. (2018) [37] and Chaw & Tang [50], these social motivations not only make MOOCs more attractive to learners, but also enhance participation, engagement, and overall performance. Furthermore, the quality of social interactions and the perceived reputation of a course, as examined by Gregori et al. (2018) [31] and Khan et al. (2018) [37], also contribute significantly to MOOC completion rates.

Technology-related motivation: Technological motivation significantly influences a learner's engagement with MOOCs, shaping the learning experience through factors such as platform usability, innovative features, and accessibility. Studies by Joo et al. (2018) [35] and Jung & Lee (2018) [36] demonstrate how an intuitive interface can boost the perceived ease of use, making learning more enjoyable. Aspects like media richness and interactivity, highlighted by Zhao et al. (2020) [59] and Deshpande & Chukhlomin (2017) [24], add a dynamic appeal to MOOCs. However, challenges like infrastructural limitations [47] and navigation difficulties can sometimes hinder progress. Despite such obstacles, the benefits of MOOCs, including wide accessibility [27, 37], and the convenience of flexible learning [47], often prevail. The incorporation of interactive and integrative design elements further strengthens the technological appeal of MOOCs, ultimately contributing to a learner's decision to continue or abandon a course.

Understanding the complex interplay between different motivational categories and their influence on MOOC completion is crucial for creating more effective learning experiences. While each motivation category play a role in MOOC completion, their combined effect may provide a more comprehensive understanding of factors that drive learners to complete these courses. Researchers have discovered that motivation categories are not isolated factors, and they often interact and influence each other [149]. For instance, academic motivation can be intertwined with personal motivation, as students may be driven both by their passion for a subject matter and by their desire to develop personally. Similarly, social motivation can enhance course motivation if learners find that engaging with peers enriches their experience and understanding of the course content. Identifying the ways in which these motivation categories intersect can help course designers and instructors tailor their MOOCs to better address the diverse needs and interests of learners. By considering the multifaceted nature of motivation, it becomes possible to create MOOCs that can more effectively engage learners, fostering a supportive environment that encourages completion. Future research should continue to explore the interplay between different motivation categories, as well as the impact of these interactions on MOOC completion rates, in order to provide a more nuanced understanding of the factors that drive learners to succeed in these courses.

Building upon the understanding of motivation categories and their influence on MOOC completion, it is vital to propose strategies that can be implemented by course designers and instructors to enhance motivation and retention in MOOCs. By addressing the diverse needs and interests of learners, these strategies aim to create more engaging and effective learning experiences.

Q2: *Which theoretical frameworks underpin the practical strategies for enhancing motivation and retention in MOOCs? How can these theoretical frameworks guide to an effective implementation of these strategies?*

3-2- Motivational Strategies and Frameworks

In this section, we delve into a comprehensive exploration of the key strategies that contribute to enhancing motivation and retention in MOOCs, offering insights into their underlying principles and the potential impact on online learning experiences. According to the comprehensive body of literature on MOOCs, the factors motivating participants to complete these courses are underpinned by a diverse array of theoretical frameworks [16, 37, 42, 49, 56, 126]. These theories offer valuable insights into understanding and enhancing student motivation, thereby reducing dropout rates in MOOCs. An analysis of these theories suggests that they broadly fall into five key dimensions: Learner's Control, Pedagogical, Technological, Social, and Engagement/Behavioral [150]. Learner's Control theories highlight the learner's role as an independent and active participant in the learning process. Pedagogical theories focus on the teaching and learning aspects of MOOCs, while Technological theories emphasize the role of new technologies and their potential for enhancing learning.

Table 3 adapted from the works of the aforementioned authors, presents these dimensions, the corresponding theories, and a brief description of each:

Table 3. Theoretical Frameworks Categorization in MOOCs Research

Dimension	Theories	Description
Learner's Control	SDT, PRT, SRLT, CVTAE	Theories emphasizing the learner's ability to learn MOOC courses in a self-directed way, considering the learner as an active agent [150].
Pedagogical	EVT, AGT, ECT, CLT, ALT, ELT, UDL	Theories focusing on the pedagogical, teaching, and learning aspects of MOOCs, including the creation of constructive learning environments and the expectations and achievements in MOOCs [151].
Technological	TAM, FT, TTAT, MRT, TNE, CHAT	Theories concerning the incorporation and utilization of innovative technologies and media in MOOCs, and their potential advantages for large-scale learning [37, 56].

Table 3 categorizes the dominant theories applied in the study of MOOCs into six groups: Learner's Control, Pedagogical, Technological, Social, Engagement/Behavioral, and Others. Learner's Control theories, such as SDT, PRT, SRLT, and CVTAE, emphasize the learner's ability to engage with MOOCs in a self-directed manner, considering them as active agents [150]. Pedagogical theories, including EVT, AGT, ECT, CLT, ALT, ELT and UDL, concentrate on the teaching and learning aspects of MOOCs, including creating constructive learning environments and managing expectations and achievements. Technological theories, like TAM, FT, TTAT, MRT, and TNE, address the adoption and application of new technologies and media in MOOCs, and how these can facilitate learning at scale [37, 56]. Social theories, such as CT, SCT, ST, and TRQ, examine social exchanges, collaborative learning processes, and activities in MOOCs, highlighting the importance of social context and interactions in learning [16, 49]. Behavioral theories, such as TPB and TRA, are employed to anticipate actions determined by existing attitudes and behavioral intentions, delineating the link between attitudes and behaviors within human activity [42]. Finally, the 'Others' category encompasses theories like MT, ITI, HTFT, and RIDT, addressing diverse facets, ranging from motivation to behavior and more, that don't comfortably align with the prior five classifications.

In the literature reviewed, Self-Determination Theory (SDT) emerged as particularly relevant. It is a psychological framework that outlines three fundamental intrinsic needs that drive human behavior: autonomy, competence, and relatedness [152]. In the context of MOOCs, SDT plays a pivotal role. MOOCs cater to the need for autonomy by enabling learners to select their preferred courses, to control their learning pace, and to maintain choice over their learning journey, thereby impacting their decisions to continue with the course [37, 153]. The element of competence in SDT is evident when learners, by engaging in MOOCs, enhance their abilities and increase their sense of effectiveness, which encourages further engagement [37, 154]. Furthermore, the need for relatedness is met as MOOCs foster a sense of belonging and facilitate social interactions, which further strengthens engagement [37]. The interplay of autonomy, competence, and relatedness in SDT thus contributes significantly to a learner's motivation, engagement, and persistence in MOOCs [35, 49].

In addition to these theoretical insights, we have also identified practical strategies that can be used to enhance motivation and retention in MOOCs. These strategies can be categorized under four main categories: Personalization, Engagement, Support, and Communication. Each of these categories can be associated with the theoretical dimensions identified earlier. For instance, personalization strategies such as adaptive learning, relevant and authentic content, and learner-centered design are closely related to the learner's control theories, including SDT. By tailoring the learning experience to the individual learner, these strategies can enhance the sense of autonomy and competence, two key components of SDT.

The choice of parameters in this systematic review—focusing on personalization, engagement, support, and communication—was guided by an extensive preliminary literature review that identified these factors as critical in influencing learner motivation and retention in MOOCs. Personalization strategies were included due to their significant role in adapting learning experiences to individual needs, thereby enhancing intrinsic motivation as suggested by Self-Determination Theory. Engagement strategies were considered because they directly influence active learning and participation, factors known to improve retention rates. Support mechanisms, such as feedback and scaffolding, were examined due to their capacity to aid learners in overcoming challenges within the course, fostering a sense of accomplishment and reducing dropout rates. Lastly, communication strategies were included because effective dialogue between learners and instructors is essential for maintaining motivation and community within online learning environments. Each of these parameters has been shown in previous empirical studies to critically affect the outcomes of educational interventions, thus justifying their selection for a focused examination in this review.

Adaptive Learning: Adaptive learning is a strategy grounded in the principles of Personal Construct Theory (PCT) and Constructivist Learning Theory (CLT). According to PCT, individuals interpret and learn about the world through their unique mental constructs. CLT, on the other hand, proposes that learners construct their understanding and knowledge of the world through experiences and reflection. By using computer algorithms to deliver custom resources and learning activities that cater to a learner's unique needs, adaptive learning systems embody these theories, fostering a more personalized and effective learning experience. These systems track a student's performance over time, and adjust

the pacing and difficulty of material based on the student's progress. Consequently, the application of these theoretical frameworks through adaptive learning can enhance student engagement, comprehension, and retention. It is important to note that the success of this approach is particularly effective in online and digital learning environments where large volumes of learning data can be analyzed and utilized [155].

Table 4. Categories of Strategies for Enhancing Motivation and Retention in MOOCs

Strategy Category	Strategy	Theoretical Support
Personalization	Adaptive Learning	SDT, TAM, SRLT
	Relevant and Authentic Content	SDT, EVT
	Learner-Centered Design	SDT, CLT, SRLT
	Learning Analytics	SDT, TAM
	Personal Learning Networks	SDT, EVT
	Personal Learning Pathways	SDT, SRLT
Engagement	Gamification	SDT, SCT, TRA
	Peer Collaboration and Support	SCT, CT, SDT
	Instructor Presence and Interaction	SCT, CT, EVT
	Real-world Applications	SDT, EVT
	Immersive Experiences (e.g., VR)	SDT, CLT
	Interactive Learning Activities and Higher Order Thinking Skills (HOTS)	SDT, CLT, ALT
Support	Regular Feedback and Assessment	SDT, FT, EVT
	Scaffolded Learning	SCT, CLT, ALT
	Accessible Course Design	TAM,UDL
	Continuous Improvement	SDT,TAM
	Multilingual Support	CHAT
	Peer Mentoring and Mentorship	SCT, SDT
Communication	Clear Communication of Expectations	SDT, EVT, TRA
	Feedback and Reflection	SDT,FT, EVT
	Multi-Modal Communication (e.g., video, audio, text)	SDT, MRT,TRA
	Social Media Integration	SCT,MRT,TAM
	Synchronous Discussions	SCT,CT,SDT

Relevant and Authentic Content: The implementation of relevant and authentic content in a learning environment is heavily informed by Experiential Learning Theory (ELT) and Situated Learning Theory (SLT). ELT emphasizes the importance of direct experience and reflection in the learning process, while SLT suggests that learning is most effective when it is directly relevant to the context in which it will be applied. By aligning educational material with real-world situations, learners are able to directly apply their acquired knowledge and skills to practical contexts, thereby fostering a deeper understanding of the subject matter. This alignment, thus, serves to boost the learner's motivation and engagement, contributing to a more meaningful and enriching learning experience. Moreover, the incorporation of such content encourages critical thinking, problem-solving, and collaboration, essential skills required in the modern workplace. These theoretical frameworks guide the effective implementation of this strategy, with research supporting its potential in fostering learners' readiness for real-world challenges [156].

Learner-Centered Design: This educational strategy prioritizes the individual needs, preferences, and objectives of the learner. It emphasizes active learning, cooperation in problem-solving, and authentic tasks that stimulate the learner. Its objective is to cultivate learner autonomy and accountability while encouraging a deeper comprehension of the subject. A key aspect of this approach is the shift from the teacher being the primary source of knowledge to learners actively creating their own understanding. This approach often necessitates adaptable learning environments and individualized learning paths. It also emphasizes the importance of continuous feedback and reflection as means for advancement. Learner-centered design is underpinned by several learning theories, including Self-Determination Theory (SDT) and Cognitive Load Theory (CLT), which underscore the importance of active participation and independence in learning. Research has demonstrated that learner-centered methods can result in improved learning outcomes and increased student motivation [157].

Learning Analytics: This strategy involves collecting, evaluating, and reporting data about learners and their environments to understand and optimize learning and the contexts in which it takes place. Educational institutions increasingly use learning analytics to enhance learner outcomes, individualize learning, and transform teaching methods.

This approach employs a range of statistical, machine learning, and data mining techniques to analyze learner data, including interactions with learning management systems, performance data, and even social and demographic data. The insights gained from learning analytics can help predict learner performance, identify students at risk, offer personalized feedback and support, and inform the design of learning environments and interventions. However, the use of learning analytics also raises important ethical and data privacy concerns [158]. The Technology Acceptance Model (TAM) supports this strategy by explaining how users come to accept and use technology.

Personal Learning Networks (PLNs): PLNs refer to the network of people and resources from which an individual learns in their informal learning context. This can include peers, mentors, teachers, online communities, social media groups, blogs, and other resources. PLNs are self-directed and evolve based on the learner's interests and goals. They provide diverse perspectives, real-time information, and support, enhancing the learner's knowledge and skills. PLNs are particularly crucial in lifelong learning and professional development, helping individuals stay current in rapidly evolving fields. Digital technologies and social media have significantly facilitated the creation and maintenance of PLNs, allowing individuals to connect and learn from others globally. Various research supports the effectiveness of PLNs in promoting learning and development [159-161]. This strategy is supported by the Expectancy-Value Theory (EVT), which explains the motivational factors that influence the individual's decision to engage in an activity.

Personal Learning Pathways: Personal Learning Pathways offer customized learning routes tailored to the individual learner's needs, interests, and goals. This approach provides learners with choices and flexibility, enabling them to set their own learning pace and select their own learning activities. Personal learning pathways are adaptable and can change in response to the learner's progress and feedback. This approach often uses digital technologies, such as learning management systems or other personalized learning platforms, to facilitate learning and track progress. Personal learning pathways promote self-directed learning and provide learners with agency, allowing them to take ownership of their learning and achieve their goals. This approach is particularly effective in promoting student engagement and motivation, as learners can pursue topics and activities that are meaningful to them. Research has shown that personal learning pathways can improve learning outcomes and promote lifelong learning [162, 163]. This strategy is underpinned by the Self-Regulated Learning Theory (SRLT), which emphasizes the role of self-regulation in the learning.

Gamification: Gamification employs game-design elements in non-gaming scenarios, which can boost user engagement, motivation, and productivity. In learning, gamification can use game-like attributes such as points, levels, challenges, and rewards to stimulate learners and render the learning process more enjoyable. It capitalizes on our innate inclination towards competition and achievement to improve learning outcomes. Gamification strategies can range from straightforward features like leaderboards to complex systems incorporating narratives and character development. However, careful design is crucial to ensure that gamification supports learning rather than distracting from it. It is most effective when it complements learning objectives and bolsters other motivation forms. Various studies have corroborated the effectiveness of gamification in promoting engagement and learning [146, 164, 165]. This strategy is underpinned by Self-Determination Theory (SDT), Social Cognitive Theory (SCT), and the Theory of Reasoned Action (TRA).

Peer Collaboration and Support: This strategy involves learners working collectively to reach shared learning goals. It can take many forms, such as group projects, study groups, peer tutoring, and online discussion forums. By collaborating, students can glean insights from each other's perspectives, build on each other's ideas, and bolster each other's learning. Additionally, this approach can promote the development of key skills like communication, teamwork, and problem-solving. Peer collaboration and support is rooted in Social Cognitive Theory (SCT) and Constructivism Theory (CT), which posit that learning is a social process that transpires when individuals engage in dialogue and cooperation. It also aligns with Self-Determination Theory (SDT), implying that feelings of relatedness and community can enhance motivation and engagement. Research indicates that peer collaboration and support can positively impact student engagement, comprehension, and retention, fostering a sense of community, particularly beneficial in online learning environments where learners might otherwise feel isolated [166].

Instructor Presence and Interaction: This strategy pertains to the instructor's active involvement in the learning process, encompassing activities such as providing feedback, facilitating discussions, addressing questions, and offering clarification or additional explanations. The instructor's presence can also involve expressing interest and concern for students, acknowledging their contributions, and cultivating a supportive, inclusive learning environment. Instructor presence and interaction is a vital factor in promoting student engagement, motivation, and learning [167]. It aids in creating a sense of community and connection, especially crucial in online learning environments where students may feel isolated. It also supports learning scaffolding and guides students towards achieving learning outcomes. This strategy is supported by social constructivism theory, emphasizing social interaction and dialogue in learning, and expectancy-value theory, suggesting that students' expectations of success and the value they assign to learning can be influenced by the instructor's support and feedback.

Real-world Applications: This approach entails incorporating practical, real-world examples and tasks into educational content, allowing learners to perceive the relevance of the knowledge or skills they are acquiring, and how they can be applied in practical, everyday scenarios. This may include case studies, project-based learning, internships, fieldwork, and other forms of experiential learning. Real-world applications can enhance student engagement and motivation by making learning more meaningful and pertinent. It can also aid students in gaining a deeper understanding of the subject matter and acquiring practical skills transferable to the workplace or other real-world contexts. Real-world applications are supported by experiential learning theory, which emphasizes the importance of experience in the learning process, and self-determination theory, suggesting that learners are more motivated when they perceive their learning as relevant and valuable. Numerous studies have shown that real-world applications can improve learning outcomes, enhance student engagement, and better prepare students for future careers or other real-world challenges [168, 169].

Immersive Experiences: Immersive experiences in learning involve engaging learners in a comprehensive, realistic, and interactive learning environment. The advent of digital technologies, such as virtual reality (VR), augmented reality (AR), or mixed reality (MR), allows for the creation of simulated environments, interactions with virtual objects, or overlays of digital information onto the physical world. Immersive experiences provide learners with opportunities to practice skills, explore scenarios, or engage with content in ways that might not be feasible or safe in the real world. By appealing to learners' senses and emotions, they make learning more engaging and memorable. Immersive experiences are supported by experiential learning theory, which emphasizes the importance of direct experience in the learning process, and cognitive load theory, suggesting that realistic, interactive environments can help manage the cognitive load involved in learning complex skills or concepts. Research has demonstrated that immersive experiences can improve learning outcomes, enhance learner engagement, and promote the development of practical skills. However, the use of immersive technologies also raises issues related to accessibility, cost, and potential for motion sickness or other adverse effects. Therefore, careful planning is needed to ensure that these technologies are used effectively and ethically [170]. As with other strategies, the specific implementation of immersive experiences can vary greatly depending on the context and the learners' needs and preferences.

Interactive Learning Activities and Higher Order Thinking Skills (HOTS): Interactive learning activities are crucial components of an engaging online learning environment. These can take various forms such as problem-solving tasks, group projects, interactive multimedia, quizzes, and more. The essence of such activities is to promote active participation from learners, leading to a more immersive and memorable learning experience. Not only do these activities make learning more enjoyable, but they also serve as a platform for developing higher-order thinking skills (HOTS). Higher-order thinking skills include critical thinking, analysis, problem-solving, and creativity. These skills are often nurtured when learners are encouraged to actively process and apply the information they learn, rather than passively receiving it. Therefore, well-designed interactive learning activities can promote the development of HOTS by presenting learners with complex problems and tasks that require more than mere memorization. For instance, an interactive case study activity may require learners to analyze a situation, evaluate different strategies, and propose a solution, thereby practicing critical thinking and problem-solving skills. Similarly, a group project may require learners to collaborate, share ideas, and create something new, thereby fostering creativity and communication skills. By promoting HOTS, interactive learning activities can increase learners' sense of competence and autonomy, which are key drivers of intrinsic motivation according to Self-Determination Theory. Consequently, the integration of interactive learning activities that promote HOTS can be an effective strategy for enhancing motivation in MOOCs [171, 172]. This approach aligns with various learning theories such as Constructivist Learning Theory and Active Learning Theory, which emphasize the importance of active involvement and cognitive engagement in the learning process.

Regular Feedback and Assessment: This strategy involves providing learners with timely, constructive feedback on their performance and regular assessment opportunities. Feedback helps learners understand their strengths and weaknesses, monitor their progress, and adjust their learning strategies. Assessment helps both learners and instructors gauge the effectiveness of the instruction and identify areas for improvement. Regular feedback and assessment can enhance learning outcomes, motivation, and self-regulation [173].

Scaffolded Learning: Scaffolded learning provides learners with structured support to master complex tasks or concepts. This involves breaking down tasks into manageable parts, providing clear instructions and examples, offering hints and prompts, or providing opportunities for guided practice. As learners develop their skills and confidence, the level of support is gradually reduced. Scaffolded learning, supported by Vygotsky's theory of the Zone of Proximal Development, can enhance learners' understanding, self-efficacy, and autonomy [174].

Accessible Course Design: Accessible course design involves creating courses that are accessible and inclusive for all learners, including those with disabilities. It can involve using accessible technologies, providing alternative formats for materials, using clear and simple language, offering flexible learning paths, and creating supportive learning environments. Accessible course design, supported by Universal Design for Learning (UDL) principles, can enhance learner engagement, satisfaction, and outcomes [175].

Continuous Improvement: Continuous improvement involves an ongoing process of evaluating, refining, and enhancing teaching and learning practices. It requires collecting and analyzing data on student performance, feedback from learners, and insights from instructors to identify areas for improvement and implement changes. Continuous improvement is rooted in reflective practice and is supported by various quality improvement frameworks, such as the Plan-Do-Study-Act (PDSA) cycle. It aims to optimize the learning experience and outcomes for learners [176].

Multilingual Support: Multilingual support in MOOCs involves providing resources, materials, and instructional design that cater to learners with different language backgrounds. This includes offering course content in multiple languages, providing translations or subtitles, and incorporating culturally relevant examples and perspectives. Multilingual support can improve learner engagement, accessibility, and overall learning outcomes, especially for learners whose native language differs from the language of instruction [177].

Peer mentoring and mentorship: Peer mentoring and mentorship are complementary strategies that provide learners with guidance, support, and knowledge sharing. Peer mentoring pairs learners with experienced peers who offer insights, assist in course navigation, and foster community and collaboration. Mentorship involves the guidance and support provided by experienced instructors or experts through virtual sessions, individualized feedback, or mentor-led discussions. Both peer mentoring and mentorship have been shown to enhance learner engagement, satisfaction, and learning outcomes in MOOCs, making them valuable mechanisms for supporting learner success and engagement [178].

Clear Communication of Expectations: Grounded in the principles of effective instructional communication and Self-Regulated Learning Theory, clear communication of expectations in MOOCs ensures learners understand what is expected of them. This strategy involves providing explicit guidelines, objectives, and assessment criteria upfront. By setting clear expectations, learners can effectively manage their learning process, a key aspect of Self-Regulated Learning Theory. This enables them to set realistic goals, manage their time efficiently, and engage more effectively in course activities. Consequently, clear communication assists learners in planning their study schedule, allocating resources appropriately, and actively participating in the learning process. This transparent approach fosters a conducive learning environment and enhances learner satisfaction and success in MOOCs [179].

Feedback and reflection: feedback and reflection play crucial roles in promoting optimal learning experiences in MOOCs, aligning with important theoretical frameworks such as Self-Determination Theory, Flow Theory, and Expectancy-Value Theory. Feedback, whether provided by instructors or peers, supports learners' basic psychological needs for autonomy, competence, and relatedness, as outlined in SDT. It offers information on performance, progress, and areas for improvement, fostering a sense of competence and intrinsic motivation. Reflection, on the other hand, encourages learners to engage in metacognitive processes, aligning with FT, where learners experience a state of deep engagement and immersion in their learning activities. By reflecting on their learning experiences, learners can identify their strengths, areas of growth, and the value of the knowledge and skills they are acquiring, as emphasized in EVT. This reflective process enhances learners' expectancy beliefs and values, promoting their motivation and persistence in the MOOC. Thus, integrating feedback and reflection in MOOCs, informed by theories such as SDT, FT, and EVT, can foster a supportive and engaging learning environment [180], leading to enhanced motivation, satisfaction, and ultimately, improved learning outcomes.

Multi-modal Communication: Underpinned by the Cognitive Theory of Multimedia Learning [181], multi-modal communication in MOOCs, which includes the integration of video, audio, and text formats, enhances communication effectiveness. Catering to diverse learning preferences and styles, this approach ensures a more inclusive and engaging learning experience. Videos provide visual demonstrations and presentations, aiding the understanding of complex concepts. Audio-based communications, such as podcasts or recorded lectures, cater to auditory learners, emphasizing verbal cues and tone. Text-based communications, including written instructions and discussion forums, support reading and textual comprehension, fostering critical thinking. The Cognitive Theory of Multimedia Learning posits that learners process information more efficiently when it's presented in both verbal and visual formats, thus multi-modal communication optimizes information processing. Consequently, incorporating such communication strategies in MOOCs promotes inclusivity, maximizes learner engagement, and enhances overall learning outcomes [182].

Social media integration: social media integration in MOOCs aligns with several theoretical frameworks, including Social Cognitive Theory, Media Richness Theory, and Technology Acceptance Model. SCT emphasizes the importance of social interaction, observational learning, and self-efficacy in the learning process. By incorporating social media tools, MOOCs provide learners with opportunities to observe and model behaviors, engage in collaborative learning, and enhance their self-efficacy. MRT examines the effectiveness of communication channels, suggesting that social media platforms, with their multimedia capabilities, provide rich channels for exchanging complex ideas, fostering engagement, and supporting knowledge creation. TAM explores individuals' acceptance and adoption of technology and integrating familiar and user-friendly social media platforms in MOOCs aligns with TAM by enhancing learners' acceptance and usage patterns. Overall, social media integration in MOOCs, informed by SCT, MRT, and TAM, promotes engagement, collaboration, and knowledge sharing, enhancing the learning experience for participants [124].

Synchronous discussions: synchronous discussions play a valuable role in facilitating real-time interaction and teamwork among learners in MOOCs. By incorporating synchronous communication tools such as live webinars, virtual classrooms, or real-time chat platforms, MOOCs enable learners to engage in immediate and dynamic discussions with instructors and peers. SCT emphasizes the importance of social interaction and observational learning, and synchronous discussions provide a platform for learners to observe and model behaviors, receive immediate feedback, and develop a sense of community. Furthermore, synchronous discussions promote the formation of Communities of Practice, where learners actively participate, share ideas, and collectively construct knowledge. This collaborative learning environment fosters social presence, engagement, and the development of critical thinking skills. By incorporating synchronous discussions in MOOCs, learners can benefit from real-time interaction, peer-to-peer learning, and the guidance of instructors, resulting in enhanced engagement, deeper understanding, and an enriched learning experience [21].

The strategies discussed have a substantial potential to enhance MOOC learning experiences and reduce dropout rates. By fostering an engaging, personalized, and effective learning environment, these strategies can boost learning outcomes and be tailored to meet the diverse needs, preferences, and objectives of learners. However, it is crucial to recognize that the successful application of these strategies is not a universal solution but rather context-dependent. Their effective implementation relies on the careful customization and adaptation to the unique context, the subject matter at hand, the learner profile, and the resources available. Hence, while these strategies come with potential advantages, they necessitate meticulous planning, execution, and constant refinement to fully realize their potential. Even with the evident potential of these strategies, they are not devoid of challenges and limitations.

As we progress into the next subsection, we will delve into a comprehensive examination of the potential hurdles and constraints associated with these strategies' implementation in MOOCs. This exploration will cover factors such as accessibility, cost, technical prerequisites, learner support, and ethical considerations. Recognizing these challenges is a fundamental step towards devising effective solutions and ensuring that our endeavors to enhance online learning are inclusive, fair, and advantageous for all learners.

Q3: *What are the limitations or challenges associated with the implementation of strategies to enhance motivation and retention in MOOCs?*

3-3- Limitations for Enhancing Motivation and Retention in MOOCs

When implementing strategies to enhance motivation and retention in MOOCs, there are several challenges to consider. One significant challenge is the cost associated with certain strategies, like integrating immersive experiences and AI, which can limit scalability. Moreover, advanced technologies may require a certain level of digital literacy, posing a learning curve for instructors and learners and affecting user experience. The effectiveness of strategies can vary depending on the context and learner profile. Some strategies may require substantial time and resources. Additionally, concerns about misuse of technology, including privacy, data security, and ethical considerations, need to be addressed. Evaluating the effectiveness of these strategies is challenging due to the complex nature of learning outcomes and the difficulty in isolating the impact of a specific strategy. Lastly, the absence of personal interaction and a sense of community in MOOCs compared to traditional classrooms can impact learner engagement and satisfaction. These challenges align with the four strategy groups mentioned earlier: Personalization, Engagement, Support, and Communication.

Personalization strategies, such as adaptive learning, relevant and authentic content, learner-centered design, learning analytics, personal learning networks, and personal learning pathways, can greatly enhance motivation and retention in MOOCs. However, implementing these strategies also comes with certain limitations and challenges. Adaptive learning involves collecting and analyzing vast amounts of learner data to provide personalized recommendations and content delivery, which can pose challenges in terms of data privacy, security, and the need for robust technological infrastructure [183]. Similarly, creating relevant and authentic content for MOOCs across diverse domains and disciplines can be a complex and time-consuming task, requiring subject matter expertise and instructional design skills [184]. Implementing learner-centered design in MOOCs necessitates the development of flexible and adaptable learning environments, as well as individualized learning paths, which can be resource-intensive and require a high level of instructional expertise [185]. Leveraging learning analytics to personalize the learning experience requires effective data collection, analysis, and interpretation, as well as the availability of appropriate technologies and tools [186]. Establishing and maintaining personal learning networks and pathways in MOOCs may require robust networking platforms, reliable support systems, and active community management to ensure effective collaboration and knowledge sharing [160, 163].

In addition to personalization strategies, engagement strategies such as gamification, peer collaboration and support, instructor presence and interaction, real-world applications, immersive experiences (e.g., VR), and interactive learning activities and higher-order thinking skills (HOTS) also play a crucial role in enhancing motivation and retention in MOOCs. However, implementing these strategies is not without its challenges. Incorporating gamification elements requires careful design and alignment with learning objectives to ensure that it enhances learning rather than distracting

from it [187]. Similarly, promoting peer collaboration and support in MOOCs can be challenging due to the asynchronous nature of online learning, which may limit opportunities for real-time interaction and collaboration [166]. Creating authentic instructor presence and interaction in online environments can be demanding, requiring effective communication strategies, timely feedback, and opportunities for meaningful engagement. Implementing real-world applications and immersive experiences may involve technical requirements, resource constraints, and the need for specialized expertise [188]. Furthermore, designing interactive learning activities and promoting HOTS may require careful curriculum design and the use of appropriate technology tools (Manciaracina, 2022).

Support strategies, such as regular feedback and assessment, scaffolded learning, accessible course design, continuous improvement, multilingual support, and peer mentoring and mentorship, are essential in enhancing motivation and retention in MOOCs. However, these strategies also come with their challenges. Providing regular feedback and assessment in MOOCs can be time-consuming and require a significant amount of resources, especially when dealing with large numbers of learners [189]. Scaffolded learning, which involves providing appropriate support and guidance to learners as they progress through a course, can be challenging to implement effectively in MOOCs, given the diverse backgrounds and learning needs of participants [92]. Accessible course design, based on principles such as UDL, requires careful planning and design, as well as familiarity with accessibility guidelines and standards [190]. Implementing continuous improvement in MOOCs necessitates ongoing evaluation, monitoring, and adjustment of courses, which can be resource-intensive and require a commitment to long-term development. Providing multilingual support in MOOCs, such as offering course materials and resources in multiple languages, can be complex and require translation, localization, and cultural adaptation efforts [191]. Lastly, establishing peer mentoring and mentorship programs in MOOCs may require dedicated resources, coordination, and support to ensure effective collaboration and guidance [192].

Communication strategies, including clear communication of expectations, feedback and reflection, multi-modal communication (e.g., video, audio, text), social media integration, and synchronous discussions, are vital for enhancing motivation and retention in MOOCs. However, implementing these strategies is not without challenges. Clearly communicating expectations in MOOCs requires effective instructional design and communication strategies, as well as an understanding of the diverse backgrounds and learning needs of participants [147]. Encouraging feedback and reflection in MOOCs can be challenging, especially when dealing with large numbers of learners and managing asynchronous communication [189]. Implementing multi-modal communication in MOOCs may require technical expertise, resources, and the availability of appropriate tools and platforms [193]. Integrating social media into MOOCs can raise concerns about privacy, data security, and the potential for misuse of technology [194]. Finally, facilitating synchronous discussions in MOOCs can be logistically challenging, given the need to accommodate learners from different time zones, varying levels of digital literacy, and potential technological barriers [195].

While there are numerous strategies available for enhancing motivation and retention in MOOCs, these strategies also come with a range of potential limitations and challenges. These encompass technical, logistical, pedagogical, and ethical considerations, and are related to the four key strategy areas of Personalization, Engagement, Support, and Communication. Therefore, it is crucial for educators, instructional designers, and MOOC providers to be mindful of these challenges when implementing these strategies, and to make informed decisions based on the specific context, learner profiles, available resources, and technological capabilities. Furthermore, continuous evaluation and improvement of these strategies are essential, as the landscape of MOOCs and online learning continues to evolve. By doing so, we can strive to ensure that MOOCs are not only widely accessible, but also effective in promoting learner motivation, engagement, and successful learning outcomes.

4- Discussion

This systematic review extensively explores the impact of various motivational strategies on learner engagement and retention in Massive Open Online Courses (MOOCs), illuminating the potential of these strategies to bolster motivation and enhance educational outcomes. It compares these findings with prior studies, offering a comprehensive analysis of how the results align with or diverge from existing research, and suggests directions for future investigation to bridge existing gaps and advance this field.

Previous research, such as that by Xiong et al. (2015) [8] and Kizilcec et al. (2017) [98], consistently highlights the importance of motivational factors in influencing MOOC completion rates, emphasizing individual learner characteristics such as self-regulation and goal setting. This review builds upon these findings by delving deeper into specific motivational strategies like personalized learning, interactive content, and peer collaboration, which have been shown to effectively address these individual characteristics. The strategies identified in this review—personalization, engagement, support, and communication—mirror elements highlighted in earlier research but extend the scope by explicitly linking them to theoretical frameworks like Self-Determination Theory (SDT), which posits that autonomy and competence are critical to enhancing intrinsic motivation.

Comparison with previous studies also reveals some discrepancies. While earlier research often focused on the quantitative analysis of dropout rates and generic motivational factors, this review contributes a qualitative depth by examining the interplay of specific strategies and their theoretical underpinnings. This approach not only confirms the multifaceted nature of motivation in MOOCs, as discussed by Zhu et al. (2020) and Wang et al. (2016) [10, 11], but also provides a structured framework for applying these insights in practical course design and implementation.

The review underscores the potency of personalization strategies in driving motivation and retention in MOOCs, noting that these strategies necessitate a careful approach towards privacy and data security issues, in addition to the need for strong technological frameworks. Future research should delve into the cultural and situational factors that affect the efficacy of personalization strategies in diverse educational environments, ensuring their adaptability and scalability. Specifically, understanding how cultural values, social norms, and educational expectations influence learner engagement and motivation could significantly enhance the global applicability of these strategies. Comparative studies across different geographical areas and educational systems can shed light on the cultural subtleties impacting these strategies' effectiveness, facilitating the design of culturally responsive and inclusive MOOCs.

Further research should focus on longitudinal studies to assess the long-term impacts of motivational strategies, as suggested by the limitations in current literature which mostly captures short-term effects. Additionally, comparative studies across different cultural contexts could elucidate how cultural differences impact the effectiveness of motivational strategies, addressing a gap highlighted by both this review and earlier research by Goopio & Cheung (2020) [6].

Moreover, there is a necessity for research into tackling the challenges and limitations associated with these strategies' deployment, such as the expenses and scalability of certain strategies like immersive experiences and adaptive learning. Finding cost-efficient solutions and innovative methods to surpass resource limitations will be key in making these strategies more accessible and sustainable in varied educational settings.

Research should also probe the possibility of synergistically integrating multiple strategies to boost motivation and retention in MOOCs. The interaction between different strategies and their combined effects on learner outcomes remain relatively untapped. By understanding how various strategies supplement and enhance each other, educators and instructional designers can devise more holistic and effective interventions to foster learner engagement and success.

Lastly, the ethical considerations related to the use of technology and data in MOOCs need to be addressed. As these strategies often depend on collecting and analyzing learner data, ensuring privacy, security, and the responsible usage of data is paramount. Future research should focus on formulating ethical guidelines and frameworks for these strategies' deployment, taking into account learner rights and consent, alongside the ethical duties of educators and institutions.

To conclude, this review has not only reinforced the contributions of the strategies discussed but also set a clear agenda for future research to continue refining the educational strategies that can foster more engaging and successful MOOC experiences. By addressing these challenges and advancing research in the recommended directions, we can further optimize the application of these strategies in MOOCs, contributing to the continued enhancement of online learning experiences.

5- Conclusion

In conclusion, this systematic review has meticulously analyzed the role of motivational strategies in boosting learner engagement and curtailing dropout rates in Massive Open Online Courses (MOOCs). It has illuminated the significant potential of approaches like personalized learning, interactive content, peer collaboration, and progress feedback to enhance learner motivation and retention. These strategies, when thoughtfully designed and implemented, can profoundly align with and stimulate learners' intrinsic motivations and specific educational aspirations. However, the review also brings to light several prevailing limitations that need addressing to maximize the effectiveness of these strategies. Key among these are technological constraints, concerns around privacy and data security, and the pressing need for a nuanced understanding of learner diversity. The formulation of comprehensive ethical guidelines for data use and safeguarding privacy in MOOC environments emerges as a crucial area for future inquiry.

Furthermore, the review underscores the vital importance of extending research into diverse cultural and educational contexts to verify the widespread applicability and efficacy of the discussed motivational strategies. There is also a marked need for longitudinal studies that can shed light on the long-term impacts of these strategies on learner motivation, ongoing engagement, and overall MOOC completion rates. Such research could provide deeper insights into the sustained effectiveness of motivational enhancements in online learning environments. Ultimately, this review contributes significantly to the ongoing refinement and development of MOOCs. By offering a detailed understanding of various motivational strategies and their impacts, it lays a solid foundation for the enhanced design and delivery of MOOCs, aiming to improve the educational experiences and outcomes for learners globally. This groundwork not only supports current educational endeavors but also sets a directive for future advancements in the field.

6- Abbreviations

MOOC	Massive Open Online Course	PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SDT	Self-Determination Theory	PRT	Psychological Reactance Theory
SRLT	Self-Regulated Learning Theory	CVTAE	Control-value theory of achievement emotions
EVT	Expectancy-Value Theory	AGT	Achievement Goal Theory
ECT	Expectation Confirmation Theory	CLT	Constructive Learning Theory
ALT	Adult Learning Theory	ELT	Experiential Learning Theory
TAM	Technology Acceptance Model	FT	Flow Theory
TTAT	Task Technology Adaptation Theory	MRT	Media Richness Theory
TNE	Theory of Network Externalities	CT	Constructivism Theory
SCT	Social Cognitive Theory	ST	Sociocultural Theory
TRQ	Theory of Relationship Quality	TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action	MT	Motivation Theory
ITI	Implicit Theory of Intelligence	HTFT	Herzberg's Two-Factor Theory
RIDT	Rogers's Innovation-Diffusion Theory	UDL	Universal Design for Learning
CHAT	Computer Human Automated Talk		

7- Declarations

7-1- Author Contributions

Conceptualization, Z.A.; methodology, Z.A.; validation, Z.A.; formal analysis, Z.A.; investigation, Z.A.; resources, A.B.; data curation, A.B.; writing—original draft preparation, Z.A.; writing—review and editing, Z.A. and A.B.; supervision, A.B.; project administration, A.B.; funding acquisition, A.B. All authors have read and agreed to the published version of the manuscript.

7-2- Data Availability Statement

Data sharing is not applicable to this article.

7-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7-4- Institutional Review Board Statement

Not applicable.

7-5- Informed Consent Statement

Not applicable.

7-6- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

8- References

[1] Hokanson, B. (2022). New approaches on education technologies: A global perspective for digital transformation. Journal of Educational Technology and Online Learning, 5(4), 775–780. doi:10.31681/jetol.1160872.

[2] Wang, Y., Fikes, T. G., & Pettyjohn, P. (2018). Open Scale Courses: Exploring Access and Opportunity for Less-Educated Learners. 2018 Learning With MOOCS (LWMOOCS), Madrid, Spain. doi:10.1109/LWMOOCS.2018.8534667.

[3] Azhar, K. A., Iqbal, N., Shah, Z., & Ahmed, H. (2023). Understanding high dropout rates in MOOCs – a qualitative case study from Pakistan. Innovations in Education and Teaching International, 61(4), 764–778. doi:10.1080/14703297.2023.2200753.

[4] Dalipi, F., Imran, A. S., & Kastrati, Z. (2018). MOOC dropout prediction using machine learning techniques: Review and research challenges. 2018 IEEE Global Engineering Education Conference (EDUCON), Spain. doi:10.1109/educon.2018.8363340.

[5] Aldowah, H., Al-Samarraie, H., Alzahrani, A. I., & Alalwan, N. (2019). Factors affecting student dropout in MOOCs: a cause and effect decision-making model. Journal of Computing in Higher Education, 32(2), 429–454. doi:10.1007/s12528-019-09241-y.

[6] Goopio, J., & Cheung, C. (2021). The MOOC dropout phenomenon and retention strategies. Journal of Teaching in Travel & Tourism, 21(2), 177–197. doi:10.1080/15313220.2020.1809050.

[7] Hakami, N., White, S., & Chakaveh, S. (2017). Motivational Factors that Influence the use of MOOCs: Learners' Perspectives - A Systematic Literature Review. Proceedings of the 9th International Conference on Computer Supported Education, Porto, Portugal. doi:10.5220/0006259503230331.

[8] Xiong, Y., Li, H., Kornhaber, M. L., Suen, H. K., Pursel, B., & Goins, D. D. (2015). Examining the relations among student motivation, engagement, and retention in a MOOC: A structural equation modeling approach. Global Education Review, 2(3), 23-33.

[9] Kizilcec, R. F., Pérez-Sanagustín, M., & Maldonado, J. J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in Massive Open Online Courses. Computers & Education, 104, 18–33. doi:10.1016/j.compedu.2016.10.001.

[10] Zhu, M., Sari, A. R., & Lee, M. M. (2020). A comprehensive systematic review of MOOC research: Research techniques, topics, and trends from 2009 to 2019. Educational Technology Research and Development, 68(4), 1685–1710. doi:10.1007/s11423-020-09798-x.

[11] Wang, X., Wen, M., & Rosé, C. P. (2016). Towards triggering higher-order thinking behaviors in MOOCs. Proceedings of the Sixth International Conference on Learning Analytics & Knowledge, 398 - 407. doi:10.1145/2883851.2883964.

[12] Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. The BMJ, 372, 71. doi:10.1136/bmj.n71.

[13] Abdullatif, H., & Velázquez-Iturbide, J. Á. (2020). Relationship between motivations, personality traits and intention to continue using MOOCs. Education and Information Technologies, 25(5), 4417–4435. doi:10.1007/s10639-020-10161-z.

[14] Alario-Hoyos, C., Estévez-Ayres, I., Pérez-Sanagustín, M., Kloos, C. D., & Fernández-Panadero, C. (2017). Understanding learners' motivation and learning strategies in MOOCs. International Review of Research in Open and Distributed Learning, 18(3), 119–137. doi:10.19173/irrodl.v18i3.2996.

[15] Alraimi, K. M., Zo, H., & Ciganek, A. P. (2015). Understanding the MOOCs continuance: The role of openness and reputation. Computers & Education, 80, 28–38. doi:10.1016/j.compedu.2014.08.006.

[16] Barak, M., Watted, A., & Haick, H. (2016). Motivation to learn in massive open online courses: Examining aspects of language and social engagement. Computers & Education, 94, 49–60. doi:10.1016/j.compedu.2015.11.010.

[17] Bayeck, R. Y. (2016). Exploratory study of MOOC learners' demographics and motivation: The case of students involved in groups. Open Praxis, 8(3), 223. doi:10.5944/openpraxis.8.3.282.

[18] Bonk, C. J., & Lee, M. M. (2017). Motivations, Achievements, and Challenges of Self-Directed Informal Learners in Open Educational Environments and MOOCs. Journal of Learning for Development, 4(1), 36–57. doi:10.56059/jl4d.v4i1.195.

[19] Brooker, A., Corrin, L., De Barba, P., Lodge, J., & Kennedy, G. (2018). A tale of two MOOCs: How student motivation and participation predict learning outcomes in different MOOCs. Australasian Journal of Educational Technology, 34(1), 73-87. doi:10.14742/ajet.3237.

[20] Buhr, E. E., Daniels, L. M., & Goegan, L. D. (2019). Cognitive appraisals mediate relationships between two basic psychological needs and emotions in a massive open online course. Computers in Human Behavior, 96, 85–94. doi:10.1016/j.chb.2019.02.009.

[21] Carrera, J., & Ramírez-Hernández, D. (2018). Innovative education in MOOC for sustainability: Learnings and motivations. Sustainability (Switzerland), 10(9), 2990. doi:10.3390/su10092990.

[22] Reparaz, C., Aznárez-Sanado, M., & Mendoza, G. (2020). Self-regulation of learning and MOOC retention. Computers in Human Behavior, 111, 106423. doi:10.1016/j.chb.2020.106423.

[23] Chang, R. I., Hung, Y. H., & Lin, C. F. (2015). Survey of learning experiences and influence of learning style preferences on user intentions regarding MOOCs. British Journal of Educational Technology, 46(3), 528–541. doi:10.1111/bjet.12275.

[24] Deshpande, A., & Chukhlomin, V. (2017). What Makes a Good MOOC: A Field Study of Factors Impacting Student Motivation to Learn. American Journal of Distance Education, 31(4), 275–293. doi:10.1080/08923647.2017.1377513.

[25] Doo, M. Y., Tang, Y., Bonk, C. J., & Zhu, M. (2020). MOOC instructor motivation and career development. Distance Education, 41(1), 26–47. doi:10.1080/01587919.2020.1724770.

[26] El Said, G. R. (2017). Understanding How Learners Use Massive Open Online Courses and Why They Drop Out. Journal of Educational Computing Research, 55(5), 724–752. doi:10.1177/0735633116681302.

[27] Eriksson, T., Adawi, T., & Stöhr, C. (2017). "Time is the bottleneck": a qualitative study exploring why learners drop out of MOOCs. Journal of Computing in Higher Education, 29(1), 133–146. doi:10.1007/s12528-016-9127-8.

[28] Moreira-Mora, T., & Espinoza-Guzmán, J. (2016). Initial evidence to validate an instructional design-derived evaluation scale in higher education programs. International Journal of Educational Technology in Higher Education, 13(1), 11. doi:10.1186/s41239-016-0007-0.

[29] Gomez-Zermeno, M. G., & Aleman De La Garza, L. (2016). Research Analysis on Mooc Course Dropout and Retention Rates. Turkish Online Journal of Distance Education. doi:10.17718/tojde.23429.

[30] Greene, J. A., Oswald, C. A., & Pomerantz, J. (2015). Predictors of Retention and Achievement in a Massive Open Online Course. American Educational Research Journal, 52(5), 925–955. doi:10.3102/0002831215584621.

[31] Gregori, E. B., Zhang, J., Galván-Fernández, C., & Fernández-Navarro, F. de A. (2018). Learner support in MOOCs: Identifying variables linked to completion. Computers and Education, 122, 153–168. doi:10.1016/j.compedu.2018.03.014.

[32] Hone, K. S., & El Said, G. R. (2016). Exploring the factors affecting MOOC retention: A survey study. Computers & Education, 98, 157–168. doi:10.1016/j.compedu.2016.03.016.

[33] Howarth, J. P., D'Alessandro, S., Johnson, L., & White, L. (2016). Learner motivation for MOOC registration and the role of MOOCs as a university 'taster.' International Journal of Lifelong Education, 35(1), 74–85. doi:10.1080/02601370.2015.1122667.

[34] James, J. L. (2022). Students as Stakeholders: Understanding Expectations Can Increase Student Retention. Journal of College Student Retention: Research, Theory & Practice, 24(1), 20–42. doi:10.1177/1521025119898844.

[35] Joo, Y. J., So, H. J., & Kim, N. H. (2018). Examination of relationships among students' self-determination, technology acceptance, satisfaction, and continuance intention to use K-MOOCs. Computers & Education, 122, 260–272. doi:10.1016/j.compedu.2018.01.003.

[36] Jung, Y., & Lee, J. (2018). Learning Engagement and Persistence in Massive Open Online Courses (MOOCS). Computers and Education, 122, 9–22. doi:10.1016/j.compedu.2018.02.013.

[37] Khan, I. U., Hameed, Z., Yu, Y., Islam, T., Sheikh, Z., & Khan, S. U. (2018). Predicting the acceptance of MOOCs in a developing country: Application of task-technology fit model, social motivation, and self-determination theory. Telematics and Informatics, 35(4), 964–978. doi:10.1016/j.tele.2017.09.009.

[38] Kim, T., Yang, M., Bae, J., Min, B., Lee, I., & Kim, J. (2017). Escape from infinite freedom: Effects of constraining user freedom on the prevention of dropout in an online learning context. Computers in Human Behavior, 66, 217–231. doi:10.1016/j.chb.2016.09.019.

[39] Kyewski, E., & Krämer, N. C. (2018). To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course. Computers and Education, 118, 25–37. doi:10.1016/j.compedu.2017.11.006.

[40] Li, Q., & Baker, R. (2018). The different relationships between engagement and outcomes across participant subgroups in Massive Open Online Courses. Computers and Education, 127(April 2017), 41–65. doi:10.1016/j.compedu.2018.08.005.

[41] Luik, P., Suviste, R., Lepp, M., Palts, T., Tõnisson, E., Säde, M., & Papli, K. (2017). What motivates enrolment in programming MOOCs? British Journal of Educational Technology, 50(1), 153–165. doi:10.1111/bjet.12600.

[42] Maya-Jariego, I., Holgado, D., González-Tinoco, E., Castaño-Muñoz, J., & Punie, Y. (2020). Typology of motivation and learning intentions of users in MOOCs: the MOOCKNOWLEDGE study. Educational Technology Research and Development, 68(1), 203–224. doi:10.1007/s11423-019-09682-3.

[43] Ortega-Arranz, A., Bote-Lorenzo, M. L., Asensio-Pérez, J. I., Martínez-Monés, A., Gómez-Sánchez, E., & Dimitriadis, Y. (2019). To reward and beyond: Analyzing the effect of reward-based strategies in a MOOC. Computers & Education, 142, 103639. doi:10.1016/j.compedu.2019.103639.

[44] Petronzi, D., & Hadi, M. (2016). Exploring the Factors Associated with MOOC Engagement, Retention and the Wider Benefits for Learners. European Journal of Open, Distance and E-Learning, 19(2), 112–129. doi:10.1515/eurodl-2016-0011.

[45] Salmon, G., Pechenkina, E., Chase, A. M., & Ross, B. (2017). Designing Massive Open Online Courses to take account of participant motivations and expectations. British Journal of Educational Technology, 48(6), 1284–1294. doi:10.1111/bjet.12497.

[46] Shao, Z. (2018). Examining the impact mechanism of social psychological motivations on individuals' continuance intention of MOOCs. Internet Research, 28(1), 232–250. doi:10.1108/intr-11-2016-0335.

[47] Shapiro, H. B., Lee, C. H., Wyman Roth, N. E., Li, K., Çetinkaya-Rundel, M., & Canelas, D. A. (2017). Understanding the massive open online course (MOOC) student experience: An examination of attitudes, motivations, and barriers. Computers & Education, 110, 35–50. doi:10.1016/j.compedu.2017.03.003.

[48] Sujatha, R., & Kavitha, D. (2018). Learner retention in MOOC environment: Analyzing the role of motivation, self-efficacy and perceived effectiveness. International Journal of Education and Development Using ICT, 14(2), 62-74.

[49] Sun, Y., Ni, L., Zhao, Y., Shen, X. L., & Wang, N. (2019). Understanding students' engagement in MOOCs: An integration of self-determination theory and theory of relationship quality. British Journal of Educational Technology, 50(6), 3156–3174. doi:10.1111/bjet.12724.

[50] Chaw, L. Y., & Tang, C. M. (2019). Driving high inclination to complete massive open online courses (MOOCs): Motivation and engagement factors for learners. Electronic Journal of E-Learning, 17(2), 118–130. doi:10.34190/JEL.17.2.05.

[51] Tsai, Y., Lin, C., Hong, J., & Tai, K. (2018). The effects of metacognition on online learning interest and continuance to learn with MOOCs. Computers & Education, 121, 18–29. doi:10.1016/j.compedu.2018.02.011.

[52] Uchidiuno, J. O., Ogan, A., Yarzebinski, E., & Hammer, J. (2018). Going Global: Understanding English Language Learners' Student Motivation in English-Language MOOCs. International Journal of Artificial Intelligence in Education, 28(4), 528–552. doi:10.1007/s40593-017-0159-7.

[53] Wang, Y., & Baker, R. (2015). Content or platform: Why do students complete MOOCs. MERLOT Journal of Online Learning and Teaching, 11(1), 17-30.

[54] Wang, Y., & Baker, R. (2018). Grit and intention: Why do learners complete MOOCs? The International Review of Research in Open and Distributed Learning, 19(3), 20–42.

[55] Watted, A., & Barak, M. (2018). Motivating factors of MOOC completers: Comparing between university-affiliated students and general participants. Internet and Higher Education, 37, 11–20. doi:10.1016/j.iheduc.2017.12.001.

[56] Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. Computers in Human Behavior, 67, 221–232. doi:10.1016/j.chb.2016.10.028.

[57] Xing, B., Zhang, L., Gao, J., Yu, R., & Lyu, R. (2016). Barrier-free affective communication in MOOC study by analyzing pupil diameter variation. SIGGRAPH ASIA 2016 Symposium on Education. doi:10.1145/2993352.2993362.

[58] Zhou, M. (2016). Chinese university students' acceptance of MOOCs: A self-determination perspective. Computers & Education, 92–93, 194–203. doi:10.1016/j.compedu.2015.10.012.

[59] Zhao, Y., Wang, A., & Sun, Y. (2020). Technological environment, virtual experience, and MOOC continuance: A stimulus–organism–response perspective. Computers & Education, 144, 103721. doi:10.1016/j.compedu.2019.103721.

[60] Alharbi, K., Alrajhi, L., Cristea, A. I., Bittencourt, I. I., Isotani, S., & James, A. (2020). Data-Driven Analysis of Engagement in Gamified Learning Environments: A Methodology for Real-Time Measurement of MOOCs. Intelligent Tutoring Systems. ITS 2020. Lecture Notes in Computer Science, 12149, Springer, Cham, Switzerland. doi:10.1007/978-3-030-49663-0_18.

[61] Antonaci, A., Klemke, R., Lataster, J., Kreijns, K., & Specht, M. (2019). Gamification of MOOCs Adopting Social Presence and Sense of Community to Increase User's Engagement: An Experimental Study. Transforming Learning with Meaningful Technologies. EC-TEL 2019. Lecture Notes in Computer Science, Vol. 11722, Springer, Cham, Switzerland. doi:10.1007/978-3-030-29736-7_13.

[62] Anutariya, C., & Thongsuntia, W. (2019). MOOC Design and Learners Engagement Analysis: A Learning Analytics Approach. 2019 International Conference on Sustainable Information Engineering and Technology (SIET), Lombok, Indonesia. doi:10.1109/siet48054.2019.8986057.

[63] Appiah-Kubi, K., & Rowland, D. (2016). PEER Support In MOOCs. Proceedings of the Third (2016) ACM Conference on Learning @ Scale. doi:10.1145/2876034.2893423.

[64] Baek, J., & Shore, J. (2016). Promoting Student Engagement in MOOCs. Proceedings of the Third (2016) ACM Conference on Learning @ Scale. doi:10.1145/2876034.2893437.

[65] Balasooriya, I., Rodríguez, M. E., & Mor, E. (2018). Assessment of Engagement: Using Microlevel Student Engagement as a Form of Continuous Assessment. Communications in Computer and Information Science, 150–162. doi:10.1007/978-3-319-97807-9_12.

[66] Bonafini, F. C., Chae, C., Park, E., & Jablokow, K. W. (2017). How much does student engagement with videos and forums in a MOOC affect their achievement? Online Learning Journal, 21(4), 223–240. doi:10.24059/olj.v21i4.1270.

[67] Borrás-Gené, O., Martínez-Núñez, M., & Martín-Fernández, L. (2019). Enhancing fun through gamification to improve engagement in MOOC. Informatics, 6(3), 1–20. doi:10.3390/informatics6030028.

[68] Bote-Lorenzo, M. L., & Gómez-Sánchez, E. (2017). Predicting the decrease of engagement indicators in a MOOC. Proceedings of the Seventh International Learning Analytics & Knowledge Conference. doi:10.1145/3027385.3027387.

[69] Brady, K., Fisher, D., & Narasimham, G. (2016). Exploring the effects of lightweight social incentives on learner performance in MOOCs. L@S 2016 - Proceedings of the 3rd 2016 ACM Conference on Learning at Scale, 297–300. doi:10.1145/2876034.2893438.

[70] Brunskill, E., Zimmaro, D., & Thille, C. (2018). Exploring the impact of the default option on student engagement and performance in a statistics MOOC. Proceedings of the Fifth Annual ACM Conference on Learning at Scale, 1-4. doi:10.1145/3231644.3231692.

[71] Cassidy, D., Breakwell, N., & Bailey, J. (2014). Keeping them clicking: promoting student engagement in MOOC design. The All Ireland Journal of Teaching and Learning in Higher Education, 6(2), 1-15.

[72] Chang, J. W., & Wei, H. Y. (2016). Exploring engaging gamification mechanics in massive online open courses. Journal of Educational Technology & Society, 19(2), 177-203.

[73] Chen, G., Davis, D., Lin, J., Hauff, C., & Houben, G.-J. (2016). Beyond the MOOC platform. Proceedings of the 8th ACM Conference on Web Science. doi:10.1145/2908131.2908145.

[74] Coetzee, D., Fox, A., Hearst, M. A., & Hartmann, B. (2014). Should your mooc forum use a reputation system? Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW, 1176–1187. doi:10.1145/2531602.2531657.

[75] Coffrin, C., Corrin, L., de Barba, P., & Kennedy, G. (2014). Visualizing patterns of student engagement and performance in MOOCs. Proceedings of the Fourth International Conference on Learning Analytics And Knowledge, 83-92. doi:10.1145/2567574.2567586.

[76] Cook, S., Bingham, P., Reid, S., & Wang, X. (2015). Going'massive': Learner engagement in a MOOC environment. THETA 2015-Create, Connect, Consume-Innovating today for tomorrow, 11-13 May 2015, Gold Coast, Australia.

[77] Crosslin, M., Dellinger, J. T., Joksimović, S., Kovanović, V., & Gašević, D. (2018). Customizable modalities for individualized learning: Examining patterns of engagement in dual-layer MOOCS. Online Learning Journal, 22(1), 19–38. doi:10.24059/olj.v22i1.1080.

[78] Crues, R. W., Bosch, N., Perry, M., Angrave, L., Shaik, N., & Bhat, S. (2018). Refocusing the lens on engagement in MOOCs. Proceedings of the Fifth Annual ACM Conference on Learning at Scale, 1-10. doi:10.1145/3231644.3231658.

[79] Davis, D., Jivet, I., Kizilcec, R. F., Chen, G., Hauff, C., & Houben, G.-J. (2017). Follow the successful crowd. Proceedings of the Seventh International Learning Analytics & Knowledge Conference, 454 - 463. doi:10.1145/3027385.3027411.

[80] De Freitas, S. I., Morgan, J., & Gibson, D. (2015). Will MOOCs transform learning and teaching in higher education? Engagement and course retention in online learning provision. British Journal of Educational Technology, 46(3), 455–471. doi:10.1111/bjet.12268.

[81] Deng, R., Benckendorff, P., & Gannaway, D. (2020). Learner engagement in MOOCs: Scale development and validation. British Journal of Educational Technology, 51(1), 245–262. doi:10.1111/bjet.12810.

[82] Deng, R., Benckendorff, P., & Gannaway, D. (2020). Linking learner factors, teaching context, and engagement patterns with MOOC learning outcomes. Journal of Computer Assisted Learning, 36(5), 688–708. doi:10.1111/jcal.12437

[83] Dubbaka, A., & Gopalan, A. (2020). Detecting Learner Engagement in MOOCs using Automatic Facial Expression Recognition. 2020 IEEE Global Engineering Education Conference (EDUCON), Porto, Portugal. doi:10.1109/educon45650.2020.9125149.

[84] Ferguson, R., & Clow, D. (2016). Consistent Commitment: Patterns of Engagement across Time in Massive Open Online Courses (MOOCs). Journal of Learning Analytics, 2(3), 55–80. doi:10.18608/jla.2015.23.5.

[85] Ferguson, R., & Clow, D. (2015). Examining engagement. Proceedings of the Fifth International Conference on Learning Analytics And Knowledge, 51 - 58. doi:10.1145/2723576.2723606.

[86] Ferguson, R., Clow, D., Beale, R., Cooper, A. J., Morris, N., Bayne, S., & Woodgate, A. (2015). Moving Through MOOCS: Pedagogy, Learning Design and Patterns of Engagement. Lecture Notes in Computer Science, 70–84, Springer, Cham, Switzerland. doi:10.1007/978-3-319-24258-3_6.

[87] Floratos, N., Guasch, T., & Espasa, A. (2015). Recommendations on Formative Assessment and Feedback Practices for stronger engagement in MOOCs. Open Praxis, 7(2), 141. doi:10.5944/openpraxis.7.2.194.

[88] Gallego-Romero, J. M., Alario-Hoyos, C., Estévez-Ayres, I., & Delgado Kloos, C. (2020). Analyzing learners' engagement and behavior in MOOCs on programming with the Codeboard IDE. Educational Technology Research and Development, 68(5), 2505–2528. doi:10.1007/s11423-020-09773-6.

[89] Goldberg, L. R., Bell, E., King, C., O'Mara, C., McInerney, F., Robinson, A., & Vickers, J. (2015). Relationship between participants' level of education and engagement in their completion of the Understanding Dementia Massive Open Online Course Approaches to teaching and learning. BMC Medical Education, 15(1), 60. doi:10.1186/s12909-015-0344-z.

[90] Gong, L., Liu, Y., & Zhao, W. (2019). Dynamics of Emotional States and Their Relationship with Learning Outcomes during Learning Python with MOOC. Proceedings of the 2019 7th International Conference on Information and Education Technology, 71 - 76. doi:10.1145/3323771.3323821.

[91] Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement. Proceedings of the First ACM Conference on Learning @ Scale Conference, 41 - 50. doi:10.1145/2556325.2566239.

[92] Hew, K. F. (2016). Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCS. British Journal of Educational Technology, 47(2), 320–341. doi:10.1111/bjet.12235.

[93] Houston, S. L., Brady, K., Narasimham, G., & Fisher, D. (2017). Pass the Idea Please. Proceedings of the Fourth (2017) ACM Conference on Learning @ Scale, 295 - 298. doi:10.1145/3051457.3054008.

[94] Hu, Y., Donald, C., Giacaman, N., & Zhu, Z. (2020). Towards automated analysis of cognitive presence in MOOC discussions. Proceedings of the Tenth International Conference on Learning Analytics & Knowledge, 135-140. doi:10.1145/3375462.3375473.

[95] Huang, J., Dasgupta, A., Ghosh, A., Manning, J., & Sanders, M. (2014). Superposter behavior in MOOC forums. Proceedings of the First ACM Conference on Learning @ Scale Conference. doi:10.1145/2556325.2566249.

[96] Kaveri, A., Gunasekar, S., Gupta, D., & Pratap, M. (2016). Decoding Engagement in MOOCs: An Indian Learner Perspective. 2016 IEEE Eighth International Conference on Technology for Education (T4E). doi:10.1109/t4e.2016.027.

[97] Khalil, M., Ebner, M., & Admiraal, W. (2017). How can gamification improve MOOC student engagement. Proceedings of the 11th European Conference on Games Based Learning, ECGBL, 5-6 October, 2017, Graz, Austria.

[98] Kizilcec, R. F., Davis, G. M., & Cohen, G. L. (2017). Towards Equal Opportunities in MOOCs. Proceedings of the Fourth (2017) ACM Conference on Learning @ Scale, 121 - 130. doi:10.1145/3051457.3051460.

[99] Labarthe, H., Bouchet, F., Bachelet, R., & Yacef, K. (2016, June). Does a peer recommender foster students' engagement in MOOCs?. 9th international conference on educational data mining, 29 June-2July 2016, Raleigh, United States.

[100] Min, L., & Foon, H. K. (2019). Self-Regulated Learning Process in MOOCs. Proceedings of the 2019 4th International Conference on Distance Education and Learning, Shanghai, China. doi:10.1145/3338147.3338161.

[101] Lan, M., & Hew, K. F. (2020). Examining learning engagement in MOOCs: a self-determination theoretical perspective using mixed method. International Journal of Educational Technology in Higher Education, 17(1), 7. doi:10.1186/s41239-020-0179-5.

[102] Bozkurt, A., & Keefer, J. (2017). Participatory learning culture and community formation in connectivist MOOCs. Interactive Learning Environments, 26(6), 776–788. doi:10.1080/10494820.2017.1412988.

[103] Lu, O. H. T., Huang, J. C. H., Huang, A. Y. Q., & Yang, S. J. H. (2017). Applying learning analytics for improving students engagement and learning outcomes in an MOOCs enabled collaborative programming course. Interactive Learning Environments, 25(2), 220–234. doi:10.1080/10494820.2016.1278391.

[104] Milligan, C., Littlejohn, A., & Margaryan, A. (2013). Patterns of engagement in connectivist MOOCs. Journal of Online Learning and Teaching, 9(2), 149-159.

[105] Nelimarkka, M., & Hellas, A. (2018). Social Help-seeking Strategies in a Programming MOOC. Proceedings of the 49th ACM Technical Symposium on Computer Science Education. doi:10.1145/3159450.3159495.

[106] Núñez, M. M., Gené, O. B., & Blanco, Á. F. (2014). Social community in MOOCs. Proceedings of the Second International Conference on Technological Ecosystems for Enhancing Multiculturality. doi:10.1145/2669711.2669893.

[107] Phan, T., McNeil, S. G., & Robin, B. R. (2016). Students' patterns of engagement and course performance in a Massive Open Online Course. Computers & Education, 95, 36–44. doi:10.1016/j.compedu.2015.11.015.

[108] Qiu, J., Tang, J., Liu, T. X., Gong, J., Zhang, C., Zhang, Q., & Xue, Y. (2016). Modeling and Predicting Learning Behavior in MOOCs. Proceedings of the Ninth ACM International Conference on Web Search and Data Mining. doi:10.1145/2835776.2835842.

[109] Ramesh, A., Goldwasser, D., Huang, B., Daume, H., & Getoor, L. (2020). Interpretable Engagement Models for MOOCs Using Hinge-Loss Markov Random Fields. IEEE Transactions on Learning Technologies, 13(1), 107–122. doi:10.1109/TLT.2018.2889953.

[110] Sharif, M., & Guilland, A. (2015). Massive Open Online Courses-Promoting Engagement Through Means of Gamification. EDULEARN15 Proceedings, 6-8 July, 2015, Barcelona, Spain.

[111] Shi, L., Cristea, A.I. (2018). In-depth Exploration of Engagement Patterns in MOOCs. Web Information Systems Engineering – WISE 2018. WISE 2018, Lecture Notes in Computer Science, vol 11234. Springer, Cham, Switzerland. doi:10.1007/978-3-030-02925-8_28.

[112] Sun, G. X., & Bin, S. (2018). Construction of learning behavioral engagement model for MOOCs platform based on data analysis. Kuram ve Uygulamada Egitim Bilimleri, 18(5), 2206–2216. doi:10.12738/estp.2018.5.120.

[113] Sunar, A. S., White, S., Abdullah, N. A., & Davis, H. C. (2017). How learners' interactions sustain engagement: A MOOC case study. IEEE Transactions on Learning Technologies, 10(4), 475–487. doi:10.1109/TLT.2016.2633268.

[114] Thaker, K., Carvalho, P., & Koedinger, K. (2019). Comprehension Factor Analysis. Proceedings of the 9th International Conference on Learning Analytics & Knowledge. doi:10.1145/3303772.3303817.

[115] Thornton, S., Riley, C., & Wiltrout, M. E. (2017). Criteria for Video Engagement in a Biology MOOC. Proceedings of the Fourth (2017) ACM Conference on Learning @ Scale. doi:10.1145/3051457.3054007.

[116] Vaibhav, A., & Gupta, P. (2014). Gamification of MOOCs for increasing user engagement. 2014 IEEE International Conference on MOOC, Innovation and Technology in Education (MITE). doi:10.1109/mite.2014.7020290.

[117] Walji, S., Deacon, A., Small, J., & Czerniewicz, L. (2016). Learning through engagement: MOOCs as an emergent form of provision. Distance Education, 37(2), 208–223. doi:10.1080/01587919.2016.1184400.

[118] Wen, M., & Rose, C. P. (2014). Identifying Latent Study Habits by Mining Learner Behavior Patterns in Massive Open Online Courses. Proceedings of the 23rd ACM International Conference on Conference on Information and Knowledge Management. doi:10.1145/2661829.2662033.

[119] Wen, X., Lin, Y.-R., Liu, X., Brusilovsky, P., & BarrÃ-a Pineda, J. (2019). Iterative Discriminant Tensor Factorization for Behavior Comparison in Massive Open Online Courses. The World Wide Web Conference. doi:10.1145/3308558.3313713.

[120] Williams, K. M., Stafford, R. E., Corliss, S. B., & Reilly, E. D. (2018). Examining student characteristics, goals, and engagement in Massive Open Online Courses. Computers & Education, 126, 433–442. doi:10.1016/j.compedu.2018.08.014.

[121] Wise, A. F. (2018). Learning Analytics: Using Data-Informed Decision-Making to Improve Teaching and Learning. Contemporary Technologies in Education, 119–143. doi:10.1007/978-3-319-89680-9_7.

[122] Wong, J.-S., Pursel, B., Divinsky, A., & Jansen, B. J. (2016). An Analysis of Cognitive Learning Context in MOOC Forum Messages. Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems. doi:10.1145/2851581.2892324.

[123] Xiao, X., & Wang, J. (2016). Context and cognitive state triggered interventions for mobile MOOC learning. Proceedings of the 18th ACM International Conference on Multimodal Interaction. doi:10.1145/2993148.2993177.

[124] Zheng, S., Han, K., Rosson, M. B., & Carroll, J. M. (2016). The Role of Social Media in MOOCs. Proceedings of the Third (2016) ACM Conference on Learning @ Scale. doi:10.1145/2876034.2876047.

[125] Zheng, S., Rosson, M. B., Shih, P. C., & Carroll, J. M. (2015). Understanding Student Motivation, Behaviors and Perceptions in MOOCs. Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing. doi:10.1145/2675133.2675217.

[126] Badali, M., Hatami, J., Banihashem, S. K., Rahimi, E., Noroozi, O., & Eslami, Z. (2022). The role of motivation in MOOCs' retention rates: a systematic literature review. Research and Practice in Technology Enhanced Learning, 17(1). doi:10.1186/s41039-022-00181-3.

[127] Moore, R. L., & Wang, C. (2021). Influence of learner motivational dispositions on MOOC completion. Journal of Computing in Higher Education, 33(1), 121–134. doi:10.1007/s12528-020-09258-8.

[128] Semenova, T. (2022). The role of learners' motivation in MOOC completion. Open Learning, 37(3), 273–287. doi:10.1080/02680513.2020.1766434.

[129] Xu, R., Sun, Z., Zhao, M., & Fu, M. (2022). How Teaching Presence Facilitate Rural Teachers' Learning Engagement in MOOC for Teacher Education: The Mediating Effect of Learning Motivation. Proceedings of the 14th International Conference on Education Technology and Computers. doi:10.1145/3572549.3572605.

[130] Estrada-Molina, O., & Fuentes-Cancell, D. R. (2022). Engagement and desertion in MOOCs: Systematic review. Comunicar, 30(70), 107–119. doi:10.3916/C70-2022-09.

[131] Nleme Ze, Y. S., & Molinari, G. (2022). Développement et validation psychométrique d'une échelle de mesure de l'engagement des apprenants dans les forums de discussion des MOOC. Distances et Médiations Des Savoirs, 40(40). doi:10.4000/dms.8538.

[132] Kuo, T. M., Tsai, C. C., & Wang, J. C. (2021). Linking web-based learning self-efficacy and learning engagement in MOOCs: The role of online academic hardiness. The Internet and Higher Education, 51, 100819. doi:10.1016/j.iheduc.2021.100819.

[133] Pérez-Sanagustín, M., Sapunar-Opazo, D., Pérez-Álvarez, R., Hilliger, I., Bey, A., Maldonado-Mahauad, J., & Baier, J. (2021). A MOOC-based flipped experience: Scaffolding SRL strategies improves learners' time management and engagement. Computer Applications in Engineering Education, 29(4), 750–768. doi:10.1002/cae.22337.

[134] Vázquez, J. A. V., Ramirez-Montoya, M. S., & González, J. R. V. (2021). Psychometric assessment of a tool to evaluate motivation and knowledge of an energy-related topic MOOC. Educational Media International, 58(3), 280–295. doi:10.1080/09523987.2021.1976827.

[135] Rohan, R., Pal, D., Funilkul, S., Chutimaskul, W., & Eamsinvattana, W. (2021). How Gamification Leads to Continued Usage of MOOCs? A Theoretical Perspective. IEEE Access, 9, 108144–108161. doi:10.1109/ACCESS.2021.3102293.

[136] Shao, Z., & Chen, K. (2020). Understanding individuals' engagement and continuance intention of MOOCs: the effect of interactivity and the role of gender. Internet Research, 31(4), 1262–1289. doi:10.1108/INTR-10-2019-0416.

[137] Cobos, R., & Ruiz-Garcia, J. C. (2021). Improving learner engagement in MOOCs using a learning intervention system: A research study in engineering education. Computer Applications in Engineering Education, 29(4), 733–749. doi:10.1002/cae.22316.

[138] Meekers, L., Kumps, A., Boumazguida, K., Temperman, G., & De Lièvre, B. (2022). Analyse de facteurs qui influencent le choix de parcours des apprenants dans le MOOC « L'innovation pédagogique dont vous êtes le héros ». Distances et Médiations Des Savoirs, 39, 43. doi:10.4000/dms.8268.

[139] Borrella, I., Caballero-Caballero, S., & Ponce-Cueto, E. (2022). Taking action to reduce dropout in MOOCs: Tested interventions. Computers & Education, 179, 104412. doi:10.1016/j.compedu.2021.104412.

[140] Schettino, G., & Capone, V. (2022). Learning Design Strategies in MOOCs for Physicians' Training: A Scoping Review. International Journal of Environmental Research and Public Health, 19(21), 14247. doi:10.3390/ijerph192114247.

[141] Yu, Z., Xu, W., & Sukjairungwattana, P. (2022). A meta-analysis of eight factors influencing MOOC-based learning outcomes across the world. Interactive Learning Environments, 32(2), 707–726. doi:10.1080/10494820.2022.2096641.

[142] Romero-Frías, E., Arquero, J. L., & del Barrio-García, S. (2023). Exploring how student motivation relates to acceptance and participation in MOOCs. Interactive Learning Environments, 31(1), 480–496. doi:10.1080/10494820.2020.1799020.

[143] Wei, X., Saab, N., & Admiraal, W. (2023). 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. The Internet and Higher Education, 56, 100880. doi:10.1016/j.iheduc.2022.100880.

[144] Huang, A. Y. Q., Lu, O. H. T., & Yang, S. J. H. (2023). Effects of artificial Intelligence–Enabled personalized recommendations on learners' learning engagement, motivation, and outcomes in a flipped classroom. Computers & Education, 194, 104684. doi:10.1016/j.compedu.2022.104684.

[145] Vezne, R., Yildiz Durak, H., & Atman Uslu, N. (2023). Online learning in higher education: Examining the predictors of students' online engagement. Education and Information Technologies, 28(2), 1865–1889. doi:10.1007/s10639-022-11171-9.

[146] Cheng, Y. M. (2023). How Different Categories of Gamified Stimuli Affect Massive Open Online Courses Continuance Intention and Learning Performance? Mediating Roles of Internal Experiences. Social Science Computer Review, 41(2), 495–527. doi:10.1177/08944393221111928.

[147] Kizilcec, R. F., & Halawa, S. (2015). Attrition and Achievement Gaps in Online Learning. Proceedings of the Second (2015) ACM Conference on Learning @ Scale. doi:10.1145/2724660.2724680.

[148] Milligan, C., & Littlejohn, A. (2017). Why study on a MOOC? The motives of students and professionals. International Review of Research in Open and Distributed Learning, 18(2), 92–102. doi:10.19173/irrodl.v18i2.3033.

[149] Veletsianos, G., Reich, J., & Pasquini, L. A. (2016). The Life Between Big Data Log Events. AERA Open, 2(3), 233285841665700. doi:10.1177/2332858416657002

[150] Piccoli, G., Ahmad, R., & Ives, B. (2001). Web-Based Virtual Learning Environments: A Research Framework and a Preliminary Assessment of Effectiveness in Basic IT Skills Training. MIS Quarterly, 25(4), 401. doi:10.2307/3250989.

[151] Altınpulluk, H., & Kesim, M. (2015). Paradigm Shifts in Augmented Reality Applications from Past to Present, Academic Informatics Conference: 4-6 February 2015. Anadolu University Eskişehir, Eskisehir, Türkiye.

[152] Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-Determination Theory Applied to Health Contexts. Perspectives on Psychological Science, 7(4), 325–340. doi:10.1177/1745691612447309.

[153] Lung-Guang, N. (2019). Decision-making determinants of students participating in MOOCs: Merging the theory of planned behavior and self-regulated learning model. Computers & Education, 134, 50–62. doi:10.1016/j.compedu.2019.02.004.

[154] Hsu, L. (2022). EFL learners' self-determination and acceptance of LMOOCs: the UTAUT model. Computer Assisted Language Learning, 36(7), 1177–1205. doi:10.1080/09588221.2021.1976210.

[155] Arsovic, B., & Stefanovic, N. (2020). E-learning based on the adaptive learning model: case study in Serbia. Sādhanā, 45(1), 266. doi:10.1007/s12046-020-01499-8.

[156] Stanley, T. (2021). What Is Authentic Learning? Authentic Learning, 7–15, Routledge, Oxfordshire, United Kingdom. doi:10.4324/9781003233152-2.

[157] Kim, J.-H. (2021). The Effects of Problem Solving Ability, Collaborative Self-efficiency, ARCS Learning Motivation, and Learning Outcomes in e-PBL. Korean Association For Learner-Centered Curriculum And Instruction, 21(11), 137–156. doi:10.22251/jlcci.2021.21.11.137.

[158] Velander, J., Otero, N., Pargman, T. C., & Milrad, M. (2021). "We Know What You Were Doing". Visualizations and Dashboards for Learning Analytics. Advances in Analytics for Learning and Teaching. Springer, Cham, Switzerland. doi:10.1007/978-3-030-81222-5_15.

[159] Haas, M. R. C., Haley, K., Nagappan, B. S., Ankel, F., Swaminathan, A., & Santen, S. A. (2020). The connected educator: personal learning networks. Clinical Teacher, 17(4), 373–377. doi:10.1111/tct.13146.

[160] Oddone, K. (2022). The nature of teachers' professional learning through a personal learning network: Individual, social and digitally connected. Teaching and Teacher Education: Leadership and Professional Development, 1, 100001. doi:10.1016/j.tatelp.2022.100001.

[161] Ekoç, A. (2022). No teacher is an island: technology-assisted personal learning network (PLN) among English language teachers in Turkey. Interactive Learning Environments, 30(7), 1183–1199. doi:10.1080/10494820.2020.1712428.

[162] Salinas, J., & De-Benito, B. (2020). Construction of personalized learning pathways through mixed methods. Comunicar, 28(65), 31–42. doi:10.3916/C65-2020-03.

[163] Peng, H., Ma, S., & Spector, J. M. (2019). Personalized Adaptive Learning: An Emerging Pedagogical Approach Enabled by a Smart Learning Environment. Lecture Notes in Educational Technology, 171–176. doi:10.1007/978-981-13-6908-7_24.

[164] Aldemir, T., Celik, B., & Kaplan, G. (2018). A qualitative investigation of student perceptions of game elements in a gamified course. Computers in Human Behavior, 78, 235–254. doi:10.1016/j.chb.2017.10.001.

[165] Zakaria, A. (2024). A Systematic Review of Gamification in MOOCs: Effects on Student Motivation, Engagement, and Dropout Rates. Journal of Educators Online, 21(2). doi:10.9743/jeo.2024.21.2.15.

[166] Yıldız, E. (2020). Investigation of Factors Affecting the Sense of Community of Distance Education Learners in Online Learning Environments. Journal of Qualitative Research in Education, 8(1), 180–205. doi:10.14689/issn.2148-2624.1.8c.1s.9m.

[167] Celik, S. (2021). Power Distance and Teacher Authority in an Online Learning Environment. Research Anthology on Developing Effective Online Learning Courses, 1665–1680, IGI Global, Pennsylvania, United States. doi:10.4018/978-1-7998-8047-9.ch083.

[168] Ginige, T. N. D. S., & Vanderwall, S. T. (2022). Effective online learning management system to improve and enhance the online learning and student engagement experience. 2022 the 6th International Conference on Information System and Data Mining. doi:10.1145/3546157.3546172.

[169] Saravanan, K. (2018). MOOC for Student Learning and Active Engagement. Advances in Educational Technologies and Instructional Design, 127–146, IGI Global, Pennsylvania, United States. doi:10.4018/978-1-5225-3634-5.ch006.

[170] Ranieri, M., Luzzi, D., Cuomo, S., & Bruni, I. (2022). If and how do 360° videos fit into education settings? Results from a scoping review of empirical research. Journal of Computer Assisted Learning, 38(5), 1199–1219. doi:10.1111/jcal.12683.

[171] Intan Kurniasih, D., Baedhowi, & Sudiyanto. (2021). The Effectiveness of Higher Order Thinking Skills (HOTS) Based E-Book to Improve Student Learning Outcomes. ICLIQE 2021: Proceeding of The 5th International Conference on Learning Innovation and Quality Education. doi:10.1145/3516875.3516882.

[172] Annan, D. K., Onodipe, D. G., & Stephenson, D. A. (2019). Using Student-Created Content Videos in Flipped Learning to Enhance Student Higher-Order Thinking Skills, Engagement, and Satisfaction. Journal of Education & Social Policy, 6(3), 1-4. doi:10.30845/jesp.v6n3p4.

[173] McMillan, J. H. (2017). Using Students' Assessment Mistakes and Learning Deficits to Enhance Motivation and Learning, Taylor & Francis Group, New York. doi:10.4324/9781315650890.

[174] Vygotsky, L. S., & Cole, M. (1978). Mind in society: Development of higher psychological processes. Harvard University Press, Cambridge, United States.

[175] Gozza-Cohen, M. (2015). Session 8: Accessible World | Practicing what we preach: Using Universal Design for Learning (UDL) Principles to Teach UDL to Pre-Service Special Education Teachers. WCSNE 2015 Proceedings. doi:10.20533/wcsne.2015.0038.

[176] Peters, V. (2018). Meeting Learners Where They Are: Using Microsoft Forms to Drive Improvement in Learning Outcomes. Digital Promise. doi:10.51388/20.500.12265/52.

[177] de Oliveira, L. C. (2023). A Language-Based Approach to Content Instruction (LACI) for Multilingual Learners. Supporting Multilingual Learners' Academic Language Development, 1–12, Routledge, Oxfordshire, United Kingdom. doi:10.4324/9781003264927-1.

[178] Mohd Sharif, M. S. A., & Ramakrisnan, P. (2023). Log Data Indicators for Identifying Learner Engagement in MOOCs. International Journal of Advanced Research in Education and Society, 5(1), 35–51. doi:10.55057/ijares.2023.5.1.5.

[179] Masrom, U. K., Nik Mohd Alwi, N. A., & Nor Asshidin, N. H. (2018). The underlying factors of learner readiness and satisfaction in blended learning environment. 2018 IEEE 6th International Conference on MOOCs, Innovation and Technology in Education (MITE). doi:10.1109/mite.2018.8747109.

[180] Hébert, T. P. (2021). Sofia Creates a Supportive Classroom Environment. Guiding Gifted Students With Engaging Books, 13–20, Routledge, Oxfordshire, United Kingdom. doi:10.4324/9781003235408-2.

[181] Perifanou, M., & Economides, A. A. (2022). The Landscape of MOOC Platforms Worldwide. International Review of Research in Open and Distributed Learning, 23(3), 104–133. doi:10.19173/irrodl.v23i3.6294.

[182] Chauhan, J., Taneja, S., & Goel, A. (2015). Enhancing MOOC with Augmented Reality, Adaptive Learning and Gamification. 2015 IEEE 3rd International Conference on MOOCs, Innovation and Technology in Education (MITE), Amritsar, India. doi:10.1109/mite.2015.7375343.

[183] Schwenkreis, F. (2018). Coaching Support by Collecting and Analyzing Data (CoCoAnDa). Opportunities And Challenges for European Projects. doi:10.5220/0008862902200225.

[184] Prediger, S. (2022). Implementation research as a task for subject-matter education disciplines: Co-constructive, content-related, and research-based. Research in Subject-Matter Teaching and Learning (RISTAL), 5(1), 4–23. doi:10.2478/ristal-2022-0103.

[185] AlOkaily, R. (2023). Evaluations of Learning Designs. Learner-Centered Instructional Design and Evaluation, 49–112, Routledge, Oxfordshire, United Kingdom. doi:10.4324/9781003317234-5.

[186] Amigud, A. (2019). Post-Traditional Learning Analytics. Emerging Trends in Learning Analytics, 13–25, Brill, Leiden, Netherlands. doi:10.1163/9789004399273_002.

[187] Shaban, A., & Pearson, E. (2019). A Learning Design Framework to Support Children with Learning Disabilities Incorporating Gamification Techniques. Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems. doi:10.1145/3290607.3312806.

[188] Cheng, Y.-M. (2023). How gamification and social interaction stimulate MOOCs continuance intention via cognitive presence, teaching presence and social presence? Library Hi Tech, 41(6), 1781–1801. doi:10.1108/lht-03-2022-0160.

[189] Bothe, M., & Meinel, C. (2020). When Do Learners Rewatch Videos in MOOCs? 2020 IEEE Learning With MOOCS (LWMOOCS), Antigua Guatemala, Guatemala. doi:10.1109/lwmoocs50143.2020.9234368.

[190] Bastedo, K., & Swenson, N. (2019). General Accessibility Guidelines for Online Course Content Creation. Universal Access Through Inclusive Instructional Design, 208–217, Routledge, Oxfordshire, United Kingdom. doi:10.4324/9780429435515-26.

[191] Edney, S., Ryan, J. C., Olds, T., Monroe, C., Fraysse, F., Vandelanotte, C., Plotnikoff, R., Curtis, R., & Maher, C. (2019). User engagement and attrition in an app-based physical activity intervention: Secondary analysis of a randomized controlled trial. Journal of Medical Internet Research, 21(11), 14645. doi:10.2196/14645.

[192] Abou-Khalil, V., Helou, S., Khalifé, E., Chen, M. A., Majumdar, R., & Ogata, H. (2021). Emergency online learning in low-resource settings: Effective student engagement strategies. Education Sciences, 11(1), 1–18. doi:10.3390/educsci11010024.

[193] Battye, A. (2022). Multi-Modal Communication. Navigating AAC, 49–52, Routledge, Oxfordshire, United Kingdom. doi:10.4324/9781003296850-12.

[194] Changchit, C., & Bagchi, K. (2017). Privacy and Security Concerns with Healthcare Data and Social Media Usage. Journal of Information Privacy and Security, 13(2), 49–50. doi:10.1080/15536548.2017.1322413.

[195] Kong, A. (2022). Understanding MOOC Learners from Different Levels of Study: An Investigation of Hospitality and Tourism. 2022 IEEE Learning with MOOCS, Antigua Guatemala, Guatemala. doi:10.1109/lwmoocs53067.2022.9927928.