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Systematic Review of Retention and Learning Engagement in Online Learning from 2015–2025

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Abstract

This study aims to explore retention issues in online learning environments, with a primary focus on the role of learning engagement. Using the PRISMA approach, we analyzed 19 publications addressing engagement and retention in online learning environments from 2015 to 2025. In terms of publication productivity on this topic, 2019 was the most productive year, followed by 2020 and 2022. Regarding learning contexts, more than half of the studies were conducted in MOOC environments. Concerning influential factors of engagement and retention, instructor-related factors or instructional strategies were the most frequently examined, followed by learner-related individual factors and course characteristics. In terms of intervention strategies, games and gamification were the most frequently implemented in these studies, followed by asynchronous online discussions. Regarding types of engagement, multiple dimensions of engagement were most frequently examined, while behavioral engagement was the most studied as a single dimension. This study suggests that engagement is a critical factor in retention in online learning and also reveals an imbalance in the engagement literature with a need for more research on emotional engagement as well as more attention paid to engagement opportunities in various forms of blended learning. Future studies are suggested to explore underrepresented areas that might contribute to enhancing retention in online learning.

Keywords: Learning engagement, retention, online learning, systematic review

Introduction

Retention issues in online learning have persisted since the emergence of distance education (Bawa, 2016; Gunawardena & Zittle, 1997; Seery et al., 2021). de Freitas et al. (2015) argued that high dropout rates represent a significant drawback, despite the strength of online learning in promoting equitable access to educational opportunities. Estimates of dropout rates in online learning vary widely. For example, some studies of online learning report dropout rates that are 10% to 20% higher than those of traditional courses (Bawa, 2016). Even more troubling, Daniel (2012) reported that completion rates of massive open online courses (MOOCs) in the initial years of MOOCs often were under 10 percent (Daniel, 2012). Due to the high dropout rates prevalent in online learning, Clow (2013) coined the term "funnel of participation" to describe participation patterns in online courses, borrowing the concept from marketing.

One influential factor in retention is students' engagement (Martin & Borup, 2022), as it increases learning motivation and a sense of belonging, thereby enhancing learning achievement and performance and ultimately leading to higher levels of student satisfaction (Li et al., 2024; Martin & Bolliger, 2018). In response, the purpose of this study was to explore retention issues in online learning environments, with a primary focus on the role of learning engagement. Retention issues have gained continuous attention in online learning because dropout rates in

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online courses are higher than those in traditional classroom settings (Lee & Choi, 2011). Many empirical studies have indicated that learning engagement is a predictor of learning outcomes and a key factor in reducing dropout rates (Bergdahl et al., 2020; Cortes, 2021; Fredricks et al., 2004; Vayre & Vonthron, 2017). However, "engagement" is a difficult construct to pin down making it extremely difficult to adequately measure. According to Newmann (1992), learning engagement is "students' psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or craft that academic work is intended to promote" (p. 12).

As delineated in common definitions of learning engagement and numerous empirical studies have reported (Doo & Kim, 2024; Lee et al., 2022; Martin & Borup, 2022), learning engagement is one of the primary influential factors of retention in online learning environments. Engagement is shaped by various factors, such as learner characteristics, learning environments, interactions with instructors and peers, and instructional design features. Instructional design and methods are particularly important because they can be designed and modified by instructors to support learning engagement. To provide practical implications for online learning instructors and administrators, the present study seeks to identify which instructional designs and technologies enhance learning engagement in ways to support higher retention in online learning, as well as further review the relationship between engagement and retention.

Literature Review

Given the significance of retention issues in online learning, numerous empirical studies, as well as systematic reviews and meta-analyses, have synthesized research findings on retention and learning engagement in online learning settings. In this review, we include representative studies addressing retention and engagement in both online learning environments and Massive Open Online Courses (MOOCs).

Learning Engagement Issues

As one of the most recent relevant studies, Doo and Kim (2024) conducted a meta-analysis synthesizing empirical studies that investigated the relationship between learning engagement and learning outcomes in online learning. The analysis included studies published between 2010 and March 2022. In total, Doo and Kim (2024) reviewed 34 empirical studies and found a small-to-medium overall effect size (g = .430). No significant differences were found among behavioral, cognitive, emotional, and general types of learning engagement. However, learning engagement showed a significantly stronger relationship with outcomes in the affective learning domain than in the cognitive and behavioral domains. Additionally, the relationship between learning engagement and learning outcomes was stronger among graduate students than among undergraduate students or adult learners.

Given that MOOCs have received substantial attention in engagement research in online learning, Wang et al. (2022) conducted a literature review on engagement in MOOCs, examining publications from 2015 to 2022. They reviewed 30 studies focusing on learning engagement in MOOCs. The types of data used as learning engagement indicators varied across studies. The most frequently used data collection methods were self-report measures (e.g., surveys) and automated analyses of log data obtained from online learning platforms.

Regarding influential factors, learning engagement was categorized into two broad types: (1) internal factors, and (2) external factors. Internal factors included learning satisfaction, academic motivation, achievement, competencies, autonomy, and self-regulated learning. External factors encompassed interaction with others, curriculum design, certificates, and technical support.

Retention Issues and Solutions

Regarding one of the primary variables of this study, Seery et al. (2021) reviewed 18 articles published between January 2015 and March 2019 and identified five themes related to retention issues in online learning. The most frequently mentioned factor was student affective and psychological factors (31.8%), followed by school-related factors, including institutional, faculty, and course factors (27.3%). Other factors included students' demographic and environmental factors (18.2%) and learning and academic factors (13.6%). Technological factors (9.1%) were the least frequently mentioned in relation to students' retention issues.

Using different types of learner groups, Paton et al. (2018) conducted a literature review on engagement and retention in vocational education and training (VET) online learning and MOOCs published between 2013 and 2017. Paton and her colleagues focused on VET programs and MOOCs because these contexts differ from traditional university education in terms of program needs, entry requirements, student age, and course duration. They analyzed 38 articles and identified 11 components related to engagement and retention. The most significant components included learners' sense of community, instructor commitment, instructional design, and assessment design.

Despite the equitable access and learning opportunities offered by online learning, as noted by de Freitas et al. (2015), there are concerns about access and engagement. Along these lines, Gardner and Leary (2023) conducted a systematic review focusing on first-generation and underrepresented minority students in online learning. They identified 15 reasons for low engagement among these students and collapsed them into three themes: (1) learner characteristics, such as language proficiency, sense of belonging, attitudes toward success, and readiness for online learning; (2) personal environments, including digital inequity, family obligations and support, and economic constraints; and (3) course-related factors, such as course design, interaction with peers and instructors, and course load. From this framework, it is clear that retention issues in online environments are multi-faceted and complex.

Strategies to Enhance Engagement and Retention in Online Learning

To achieve practical implications to enhance engagement and retention in online learning, we summarized each author's suggestions. At the end of their systematic review, Gardner and Leary (2023) emphasize that accurate recognition of where online learners are facing challenges in their student engagement framework or environment can help reveal or confirm what types of support are needed and allow for more targeted interventions. For instance, if lack of motivation is an issue, a mentoring program (Torres-Gracia, Zamudio-Orozco, & Garcia, 2026) could be considered as well as embedding mechanisms to acknowledge learning milestones. If a digital divide issue is apparent, learners might be made aware of campus technology or support resources or free and open educational resources from the world community (Bozkurt, et al., 2023; Canessa & Pisani, 2013; Naidu, 2023; UNESCO, 2022). If there are apparent issues with the course design features or structures, there might be a need for real world examples and

chances to apply course content. Flexible course design and delivery (Barua & Lockee, 2024) with opportunities for prompt feedback might also prove advantageous. In addition, such ideas can address cultural challenges and barriers.

Research from Seery et al. (2021) identified several areas for improvement to enhance retention. Course development (29.4%), student success support (26.5%), and faculty involvement (23.5%) together accounted for nearly 80% of the recommendations. Other, less frequently mentioned areas were related to engagement, including social engagement (11.8%) and emotional engagement (8.8%). Similarly, Paton et al. (2018) proposed several directions for future research to enhance engagement and retention, including instructionally sound course design, assessments consistent with learning objectives, opportunities for peer collaboration, sustained instructor communication, certification, and opportunities for further study.

In their study on student perceptions related to the importance of engagement in online learning environments, Martin and Bolliger (2018) surveyed 155 students to identify effective engagement strategies in online learning. They categorized these strategies into learner-to-learner, learner-to-instructor, and learner-to-content interactions, which align with Moore's (1993) three types of interaction in distance education. The findings indicated that learner-to-instructor strategies were perceived as the most important, including regular announcements or email reminders and the provision of grading rubrics for all assignments. Regarding learner-to-learner strategies, icebreaker or introductory discussions and collaborative work using online communication tools were identified as effective. For learner-to-content interaction, real-world projects and discussions guided by structured questions were perceived as beneficial for enhancing engagement in online learning.

Padilla Rodriguez et al. (2020) observed that participation in online learning tends to decrease as courses progress, contributing to low completion rates. Based on this finding, they compared different lengths of courses—one 6-week course and two 3-week courses. The results showed that students enrolled in the two 3-week courses were more active and engaged in learning.

As we have also shown, online learning engagement can vary drastically depending upon the timing, extent, and immediacy of the interaction as seen through the lens of synchronous versus asynchronous interaction (Bonk et al., 1998; Bonk, 2020; Park & Bonk, 2007). For instance, synchronous interactions (i.e., where participants learn at the same time) often result in briefer but more numerous interactions than asynchronous interactions (i.e., where participants learn at different times). On the other hand, asynchronous computer conferencing in online courses has been shown to foster more thoughtful and extended conversations and reflections than synchronous ones (Bonk et al., 1998).

In reviewing over a decade of fully online and blended courses at the University of Illinois Springfield, Boles et al. (2010) concluded that small class sizes of 25 students or less can lead to closer faculty and student relationships which can contribute to higher retention rates. Boles and her colleagues also found that student peer mentors can elevate retention by modeling best practices and facilitating online discussions, tracking participation, providing technology training when needed, lending key course insights, and answering student questions as they arise. Similarly, program coordinators can maintain close contact with students and keep track of student schedules and course progress, while supporting students who face particular barriers and challenges. Along these same lines, de Freitas et al. (2015) offered suggestions to make MOOCs

more engaging, such as incorporating gamification elements, using interactive learning content, providing immediate feedback on assessment results, and implementing personalized learning.

Among various engagement typologies, we adopted Fredricks et al. (2004) school engagement framework, a multidimensional model that encompasses behavioral, cognitive, and emotional engagement (Martin & Borup, 2022). In an online or blended course, behavioral engagement or involvement and effort might be seen in student participation in discussion forums, questions raised in an online presentation, making an online presentation, online sharing of one's projects, and suggesting relevant online resources. In contrast, cognitive engagement involves a learner's intellectual effort and investment in a class such as integrating seemingly disparate ideas in an online concept map or timeline, posting a weekly online blog or journal reflecting on what one has learned, and summarizing a discussion thread for key themes. Emotional or affective engagement might be displayed when sending positive emoticons during online group presentations, clapping or smiling at the end of an online guest speaker presentation, and social acknowledgements and thank you notes sent in an online discussion forum.

Accordingly, the research questions guiding this study are as follows:

1. What factors influence engagement and retention in online learning environments?
2. Which instructional methods and strategies are used to enhance learning engagement and retention in online learning environments?
3. Which types of online learning formats (e.g., fully online, blended, flipped, MOOCs, etc.) are most extensively researched in relation to engagement and retention?
4. Among behavioral, cognitive, and emotional engagement, which type is most frequently examined in relation to retention in online learning?

Methods

This study adopts a systematic review approach because retention is a broad concept that may not be fully explored through quantitative research such as meta-analyses (Martin, 2025). SPSS and Excel were utilized to help organize and analyze the data. To select eligible studies for this review, we applied the following inclusion criteria:

(1) studies that examined retention issues in online learning environments;

(2) peer-reviewed journal articles published within the last 10 years (since 2015);

(3) empirical research, including qualitative or quantitative studies employing a rigorous research design; and

(4) studies published in English.

We included all relevant research regardless of school levels, so school levels are neither inclusion nor exclusion criteria. Exclusion criteria included conceptual or theoretical papers and review articles such as meta-analyses or systematic reviews. Also excluded from this systematic review were non-peer-reviewed journals including dissertations and technical reports. Finally, we did not include publications prior to 2015, and studies published in languages other than English.

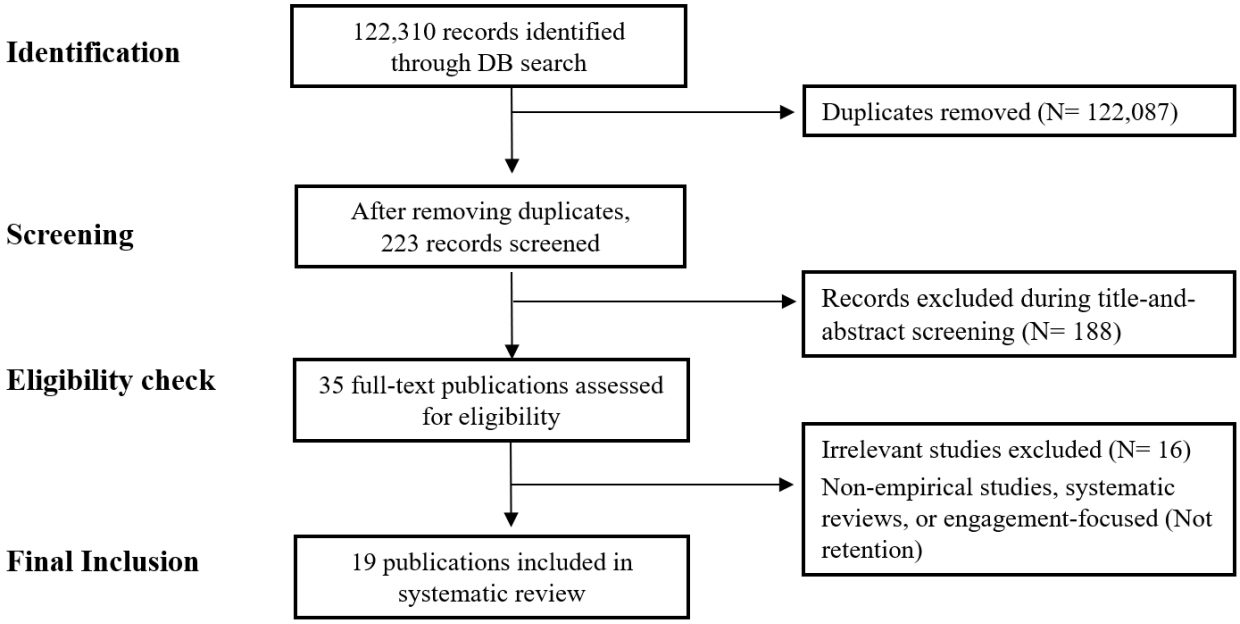
The keywords used for the search include “retention,” “dropouts,” “completion,” “learning engagement,” “cognitive engagement,” “emotional engagement,” “behavioral engagement,” “online learning,” “MOOCs,” “blended learning,” “flipped learning,” and their combinations. For the electronic database search, Google Scholar, Web of Science, ERIC (ProQuest), and Education Source (EBSCOhost) were used. The following Boolean search string was employed: (“retention” OR “dropouts” OR “completion”) AND (“learning engagement” OR “cognitive engagement” OR “emotional engagement” OR “behavioral engagement”) AND (“online learning” OR “MOOCs” OR “blended learning” OR “flipped learning”). Note that we purposefully relied on the above-mentioned four databases—Web of Science, Google Scholar, ERIC, and Education Source—due to Google Scholar's lack of reproducible indexing (Bramer, 2016; Tay, 2024). Hence, Google Scholar was useful as a supplement rather than as a primary database. In particular, Gusenbauer and Haddaway (2020) discovered extensive variations in the performance of different search engines. They point out that this variation requires substantive caveats when Google Scholar is used for systematic searches of the literature as the principal search engine.

To help ensure that no relevant studies are missed, an additional manual search was conducted in peer-reviewed journals highly relevant to the research topic, including *Online Learning Journal*, *Distance Education*, *American Journal of Distance Education*, and *The Internet and Higher Education*.

As a guideline for conducting this systematic review, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was used to identify studies eligible for analysis (Martin, 2025). The PRISMA framework is depicted in Figure 1. The quality of the studies identified through PRISMA were assessed using the Joanna Briggs Institute (JBI) checklist for systematic reviews (Aromataris et al., 2015; Aromataris et al., 2024). A recent study from Jia and Stern (2026) revealed that the JBI systematic reviews effectively utilize a variety of methods to determine studies for inclusion and exclusion based on the results of critical appraisal. In the present study, the uses of the JBI checklist found no major concerns in terms of methodology. Once the analysis scheme for this systematic review was established, two of the authors independently conducted full-text coding to determine study eligibility. The second author coded ten studies, and the third author independently coded nine. To assess inter-rater reliability, the third author randomly selected five of the ten studies coded by the second author, and the coding of these five overlapping studies was compared. Discrepancies were discussed and resolved by consensus, and coding definitions were refined when needed to clarify ambiguous cases. Notably, intercoder reliability was high (Cohen’s $k = .92$), and disagreements were resolved through discussion and additional review.

Figure 1

PRISMA Chart



Results

Descriptive data

We analyzed 19 publications that met our inclusion criteria. In terms of publication year, 2019 was the most productive year (four studies), followed by 2020 and 2022 (three studies each). Two studies were published in each of the following years: 2017, 2023, 2024, and 2025. Only one study was published in 2015, and no eligible publications were identified in 2021. The publications included in this study represented research conducted in 13 countries. China was the most productive country in research on engagement and retention in online learning ($N = 6$, 31.6%), followed by Australia and Taiwan ($N = 2$, 10.5% each). One publication each was contributed by researchers in Austria, Israel, Mexico, Colombia, Jamaica, Japan, Spain, the United Kingdom, the United States, and Vietnam. Notably, none of the 19 studies were specifically focused at the K-12 level.

Quantitative studies were the most prevalent research design (N = 8, 42.1%), including employing survey methods (e.g., Wang et al., 2019; You, 2022) and quasi-experimental designs (e.g., Huber et al., 2023; Rosser-Majors et al., 2022). The second most common approach involved the use of learning analytics (N = 5, 26.3%), such as analyzing participants' log data (e.g., Ortega-Arranz et al., 2019; Umer et al., 2017). Most of these studies were conducted in MOOC contexts. Three qualitative studies were identified (N = 3, 15.8%), including case studies (e.g., de Freitas et al., 2015) and in-depth interviews (e.g., Kahn et al., 2017). Other research designs included two (N = 2, 10.5%) mixed-methods studies (e.g., Hsu et al., 2025; Lan et al., 2020) and one action research study (e.g., Gay et al., 2020).

Across the 17 studies reporting participant data, the average sample size was 122,394.94 (*SD* = 502,182), ranging from eight (Kahn et al., 2017) to 2,071,147 (Wang et al., 2019). Two studies were excluded from this calculation: one study that used a "course" as the unit of analysis (Umer et al., 2017), and another study that employed a case study design (de Freitas et al., 2015). The substantial variation in sample sizes reflects the diversity of research methods, ranging from in-depth interviews to large-scale analyses of MOOC log data. Notably, Wang et al.'s (2019) study of over two million participants in a MOOC analyzed log data from a MOOC platform, resulting in their exceptionally large sample. Subtracting this outlier study, the average sample size decreased to 597.90 (*N* = 16).

The school levels of participants varied across studies, including high school students, undergraduates, graduate students, adult learners, and mixed-level samples. Undergraduate students comprised the largest proportion (42.1%), followed by studies including participants from all educational levels (31.6%). High school students, graduate students, and adult learners were each represented in one study.

Influential Factors of Engagement and Retention

Beyond identifying frequently studied variables, a synthesis of the reviewed studies revealed three distinct pathways through which engagement appeared to support retention. First, many studies conceptualized retention as a consequence of behavioral participation. Second, several studies suggested that retention is influenced by cognitive investment in learning rather than participation alone. Third, retention appeared connected to psychological and affective factors, even when emotional engagement was not explicitly measured. The primary dependent variables were course completion (N = 9, 47.4%), retention (N = 4, 21.1%), dropout rate (N = 2, 10.5%), and intention of retention (N = 1, 5.3%).

Regarding independent variables, instructor-related factors or instructional strategies were the most frequently examined (N = 5, 26.3%). These included game-based learning and gamification (Hsu et al., 2025; Huber et al., 2023; Ortega-Arranz et al., 2019), instructor training (Rosser-Majors et al., 2022), and high-touch student engagement strategies (Gay et al., 2020). Learner-related individual factors were the second most frequently investigated category (N = 4, 21.1%), encompassing demographic characteristics (Deng et al., 2017), psychological factors (Vo & Ho, 2024; Yang et al., 2020), and metacognitive reflexivity (Kahn, 2017). Course characteristics were also commonly examined (*N* = 4, 21.1%), particularly course length (Padilla Rodriguez et al., 2020) and assessment difficulty (de Freitas et al., 2015). Additionally, one study explored the effects of learning support on retention (Fan et al., 2024).

Instructional Methods and Strategies for Engagement and Retention

The second research question examined instructional methods and strategies designed to enhance learning engagement and retention in online learning environments. Because several studies included multiple courses or MOOCs, specific instructional methods or strategies were not reported in eight studies (*N* = 8, 42.1%). Among the reported approaches, games and gamification were the most frequently implemented strategies (*N* = 4) (e.g., Huber et al.; Ortega-Arranz et al.). Asynchronous online discussions were also commonly used (*N* = 3) (e.g., Gay et al.; Kahn et al.). Other instructional approaches included the integration of multiple strategies within a single course (e.g., Rosser-Majors et al.), active learning (e.g., Lan et al.), e-book–based

learning (e.g., Kuromiya et al.), and multimedia-supported teaching with instructor interaction (e.g., Fan et al.).

Types of Online Learning Contexts in Engagement and Retention Research

The third research question compared the types of online learning formats examined in studies of engagement and retention. The findings indicate that more than half of the studies were conducted in MOOC contexts ($N = 10$, 52.6%) (e.g., Deng et al., 2019; Hsu et al., 2025; Wang et al., 2019), outnumbering other forms of online learning. Fully online courses represented the second most frequently examined format ($N = 6$, 31.6%) (e.g., Huber et al., 2023; Kuromiya et al., 2022; Soffer et al., 2019). Additionally, two studies were conducted in online degree programs (Kahn et al., 2017; Vo & Ho, 2024). Only one study examined engagement and retention in the context of blended learning (Fan et al., 2024).

Types of Learning Engagement Associated with Retention

Using Fredricks et al.'s (2004) framework as an analytic lens revealed an important pattern across the reviewed literature. Although engagement is theoretically understood as a multidimensional construct encompassing behavioral, cognitive, and emotional dimensions, retention research has concentrated disproportionately on behavioral engagement. In effect, we analyzed and compared the types of learning engagement examined by the 19 studies included in this systematic review. Fredricks et al.'s (2004) school engagement framework was the most commonly used. Because each publication adopted different theoretical frameworks or typologies of engagement, direct comparisons using a single universal classification were not appropriate. As a single dimension, behavioral engagement was the most frequently examined ($N = 7$, 36.8%). In contrast, only one study focused exclusively on cognitive engagement in the context of engagement and retention. No studies examined social, affective, or emotional engagement as standalone dimensions.

An equivalent proportion of studies ($N = 7$, 36.8%) investigated multiple dimensions of engagement simultaneously. For example, Deng et al. examined behavioral, cognitive, emotional, and social engagement; Vo and Ho (2024) examined affective, cognitive, and behavioral engagement; and Soffer et al. examined cognitive, behavioral, and emotional engagement. Finally, four studies (21.1%) conceptualized engagement as a general, unidimensional construct rather than distinguishing among specific dimensions (e.g., She et al.; Yang et al., 2023).

Discussion

The purpose of this review was to synthesize recent empirical evidence on engagement and retention in online learning environments and to identify instructional and contextual factors that support sustained participation. Consistent with long-standing concerns about attrition in distance education (Bawa, 2016; Lee & Choi, 2011), the findings reaffirm that retention remains a central challenge across diverse online formats, particularly in MOOCs. At the same time, this review advances the field by systematically mapping instructional strategies, learning contexts, and engagement dimensions examined in relation to retention, revealing both convergences with prior research as well as critical gaps in that research.

Compared with previous systematic reviews, the present study offers several distinct contributions. Rather than reviewing engagement or retention independently, this review synthesizes empirical evidence examining the relationship between these two constructs across multiple online learning contexts. Furthermore, by organizing the literature using Fredricks et al.'s (2004) multidimensional engagement framework, the review identifies a clear imbalance in the existing evidence, with behavioral engagement receiving substantially greater attention than cognitive or emotional engagement. Finally, this review integrates instructional strategies, engagement dimensions, learning contexts, and retention outcomes into a single synthesis, providing a more comprehensive perspective on how instructional design can foster learner persistence in online learning environments. These contributions extend prior reviews by highlighting both theoretical gaps and practical opportunities for future research and instructional practice.

In addition, the present study includes more recent research than any of the previous studies mentioned above as it entails publications from 2015-2025. This is important as online learning has become more prominent and familiar to educators as a result of the COVID-19 pandemic which arose in 2020. The past decade has also witnessed an explosion of new online and blended learning format and delivery mechanisms such as MOOCs (Bonk et al., 2015; Zhu et al., 2020), HyFlex forms of learning (Beatty, 2019), and micro-credentials (Higher Education Commission in Mauritius, 2025; Martin & Mhicil, 2025).

Engagement as a Central Mechanism for Retention

Across the reviewed studies, we found that course completion and retention were the most frequently examined dependent variables, reinforcing the field's focus on persistence outcomes. The prominence of instructor-related and instructional design variables as independent predictors aligns with prior syntheses emphasizing the importance of course development, faculty involvement, and instructional quality (Paton et al., 2018; Seery et al., 2021). These findings extend earlier work suggesting that engagement serves as a key mechanism linking instructional design to learning outcomes (Bergdahl et al., 2020; Fredricks et al., 2004).

The present results are consistent with Doo and Kim's (2024) recent meta-analysis, which found a significant positive relationship between engagement and learning outcomes in online settings. Although Doo and Kim (2024) reported no significant differences among behavioral, cognitive, and emotional engagement in predicting outcomes, this review indicated that behavioral engagement is disproportionately emphasized in retention studies. This discrepancy suggests that, while multidimensional engagement frameworks are theoretically recognized (Fredricks et al., 2004), empirical investigations of retention tend to operationalize engagement through observable behaviors such as logins, assignment submissions, and discussion participation, particularly in learning analytics and MOOC-based research.

This behavioral emphasis may partially reflect the availability of large-scale log data (Wang et al., 2022). However, given that affective and psychological factors were identified as the most frequently mentioned retention-related themes in prior reviews (Seery et al., 2021), the limited standalone examination of emotional or cognitive engagement in the current corpus signals a theoretical and methodological imbalance. Emotional engagement, such as sense of belonging and enjoyment, has been previously linked to persistence and satisfaction (Martin & Bolliger, 2018); yet, emotional engagement remains underexplored as an independent predictor of

retention. Thus, this study highlights a critical need for future research to incorporate multidimensional and theory-driven measures of engagement beyond behavioral proxies.

Instructional Design and Gamification as Prominent Strategies

Consistent with earlier recommendations (de Freitas et al., 2015; Paton et al., 2018), gamification and game-based learning emerged as the most frequently implemented instructional strategies to enhance engagement and retention. This trend suggests growing interest in motivational design features to counteract the "funnel of participation" described by Clow (2013). Gamified elements, such as badges, leaderboards, and progress tracking, may foster behavioral persistence and short-term engagement (Meng, et al., 2024); however, whether they cultivate deeper cognitive or emotional investment remains an open question.

Asynchronous discussions were another commonly reported strategy, echoing Moore's (1993) interaction framework and Martin and Bolliger's (2018) findings that learner-instructor and learner-learner interactions are perceived as critical to engagement. These findings reinforce the notion that social presence and instructor communication are central to sustained participation. In contrast, relatively fewer studies explicitly examined structured student support systems, despite prior reviews emphasizing their importance for retention (Seery et al., 2021). This gap suggests that while course-level instructional strategies receive extensive or exclusive attention, institutional-level support mechanisms may be underrepresented in engagement-focused research.

Course characteristics, such as length and assessment difficulty, were also identified as influential. The finding that shorter or modularized courses may promote sustained participation aligns with Rodriguez et al.'s (2021) observation that, in longer courses, engagement declines over time. This pattern resonates with the broader literature on temporal attrition in MOOCs (Daniel, 2012), MOOC-like derivatives, and other online learning formats. It also suggests that instructional pacing and workload design are critical levers for improving retention.

MOOC Dominance and Implications for Generalizability

More than half of the reviewed studies were conducted in MOOC contexts, reflecting the availability of large-scale data and the visibility of retention challenges in open-access environments. While MOOCs provide valuable insights into participation patterns at scale, they differ substantially from credit-bearing online courses and degree programs in terms of learner motivations, entry requirements, and accountability structures (Paton et al., 2018). Consequently, the dominance of MOOC-based research may limit the generalizability of findings to other online learning formats.

Fully online courses constituted the second most frequently examined format, whereas blended learning was minimally represented. Given the increasing adoption of hybrid and blended models in K-12 (Tucker, 2020) and higher education (Beatty, 2019; Stein & Graham, 2014), this imbalance highlights an important direction for future inquiry. Perhaps the variety of blended learning formats, structures, and components make it more complex and difficult to study and coherently report about. Along these same lines, blended learning research might be more difficult to understand and interpret due to the multiple components and easily changeable ingredients. At the same time, it is plausible that blended formats are transformed and replaced

more quickly than fully online ones. Comparative studies across formats could clarify whether engagement–retention dynamics differ based on course structure, learner population, or institutional context.

Learner Characteristics and Equity Considerations

Although instructor-related variables were most frequently studied, learner-related individual factors, including psychological variables, metacognitive reflexivity, and demographic characteristics, also emerged as influential. These findings echo Gardner and Leary's (2023) review, which emphasized learner characteristics, personal environments, and course-related factors as contributors to low engagement among first-generation and underrepresented students.

Notably, technological factors were rarely foregrounded in prior reviews (Seery et al., 2021), and our findings similarly suggest that retention challenges are less about access to technology tools and resources per se and more about different psychological, pedagogical, and design factors. This finding underscores the importance of viewing retention through a socio-ecological lens that integrates individual, instructional, and contextual dimensions rather than attributing attrition solely to technical barriers. Refined adjustments to that lens will require concerted efforts of researchers in this space both to conduct research on retention and learning engagement in online environments as well as to translate their findings so that educators and instructional designers can implement them for increasingly effective and higher quality courses and experiences.

Practical and Policy Implications

The findings of this review have important implications for instructional designers, online instructors, institutional administrators, and educational leaders seeking to improve learner engagement and retention in online learning environments.

Implications for instructional designers and instructors.

The findings suggest that engagement should be intentionally designed rather than assumed to emerge naturally during online learning. Because instructor-related factors and instructional strategies were the most frequently identified influences on engagement and retention, instructional designers should incorporate evidence-based engagement strategies throughout course development. These include designing regular instructor communication, providing timely and personalized feedback, facilitating structured asynchronous discussions, integrating collaborative learning opportunities, and using gamification or other motivational features when aligned with learning objectives. Importantly, instructional designers should move beyond promoting behavioral engagement alone by designing activities that also foster cognitive engagement through reflection and problem-solving as well as emotional engagement by cultivating learners' sense of belonging, motivation, and connection to the learning community.

Implications for institutional administrators.

Improving student retention requires coordinated institutional support in addition to effective course design. Institutions should invest in professional development that equips faculty with strategies for promoting online engagement and sustaining instructor presence. Learning

management system analytics can be leveraged to identify students exhibiting early signs of disengagement, enabling timely outreach and academic support before withdrawal occurs. Institutions should also establish integrated student success services, including academic advising, tutoring, technical support, and mental health resources, that address the multiple factors influencing learner persistence identified across the reviewed studies.

Policy implications.

At the institutional level, learner engagement and retention should be recognized as shared organizational responsibilities rather than solely the responsibility of individual instructors. Institutions should develop policies and quality standards that encourage evidence-informed online course design, regular monitoring of engagement indicators, and continuous evaluation of student retention initiatives. Resource allocation should prioritize faculty development, instructional design support, learning analytics infrastructure, and student support services that have the potential to improve persistence in online learning. As online and blended learning continue to expand across higher education, institutional policies that systematically support learner engagement may contribute to improved student success, equity, and completion rates.

Limitations

This study has several limitations that need to be mentioned. First, none of the studies included in this systematic review of the research was focused squarely on the K-12 level. As K-12 schools and school districts increasingly provide online and blended learning course options (Stein & Graham, 2014; Tucker, 2020), it is vital to better understand how learner retention and engagement are impacted when youth engage in highly digital forms of learning. Another limitation was that only peer-reviewed journal articles published in English within the past 10 years were included, which may have excluded relevant studies published in other languages and contributed to the relatively small sample size ($N = 19$). Given that online learning emerged during the 1990s, there may be informative research on online learning retention, motivation, and engagement prior to 2015. In addition, we might have excluded important discussions of online learner engagement and retention found in book chapters, conference proceedings, institutional reports, newspapers, and dissertation theses. Consequently, we were unable to obtain a complete picture of the country of origin of MOOC research due to our restriction to publications in English journals.

We also are aware that by focusing specifically on engagement and retention together in online learning environments, studies addressing only engagement or only retention may not have been fully captured. It is conceivable that many individual studies used different terminology—such as retention, dropout, or completion—which may have limited the comprehensiveness of the search and selection process. Similarly, as mentioned earlier, learner engagement is a multi-dimensional or multi-faceted construct that could refer to behavioral, cognitive, or emotional engagement or some mix between these three aspects of engagement. Such complexity makes it extraordinarily hard to review the existing literature and summarize key data patterns found in it.

Finally, there are inherent limitations in the use of systematic reviews of the research instead of primary research data studies. For instance, systematic reviews are compiled summaries of the research data in studies meeting set criteria. As a result, the analyzed data sets are often stripped

of unique characteristics or specific findings or suggestions for the field. In addition, such reviews pool individual studies that may each suffer from assorted biases, small sample sizes, and data selection and presentations issues. The studies meeting all the criteria may also be constrained by statistical heterogeneity in terms of research protocols and procedures, sampling, and outcome measures. Researchers should be aware of these various limitations when conducting follow-up studies as they seek to make important contributions to the online and blended learning fields.

Future Directions

Among the future research possibilities, future advances in generative AI technology might enable novel forms of learner feedback, mentoring, resource allocation, and content accessibility that could result in enhanced insights into effective learner engagement and retention strategies and practices (Rad et al., 2024) whether in solitary learning pursuits or in team competitions (Bonk et al., 2025; Kim, 2024). It is plausible that AI assistants like chatbots might transform learning environments in ways that elevate learner retention across educational sectors and learner age brackets. Clearly, there are myriad opportunities for researchers to explore various forms of AI technology in education as well as generative AI pedagogy for learning engagement and retention.

One thing is certain, new waves of technology tools will emerge during the coming decade or two for educators to experiment with as they attempt to enhance learning engagement, and, in turn, elevate learner retention. As they do, new forms of behavioral, cognitive, and emotional or affective engagement will undoubtedly arise across every sector of education from young learners to adults. At the same time, online and blended learning derivatives, expansions, enhancements, and evolvements will transform the entire educational ecosystem (Kim & Chung, 2015; Kim & Lee, 2020) and create learning delivery formats and opportunities that few, if any, are contemplating or planning for today. As that happens, learning engagement and its steadfast companion, learning retention, will continue to be critical variables for educational researchers to explore and for instructional designers, institutional administrators, and government policy makers to support financially, conceptually, technologically, and pragmatically.

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The authors have no competing interests to declare that are relevant to the content of this article.

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*References marked with an asterisk indicate studies included in the systematic review

Appendix

Table 1

Coding Scheme for Study Characteristics

Category	Code	Definition
Engagement types	Behavioral	Engagement reflected in learning behaviors or participation
	Cognitive	Engagement involving mental effort, thinking, or investment in learning.
	Emotional	Affective status, reactions, feelings, or attitudes toward learning
	Multiple	Two or more engagement types were examined in the study
	Overall	Engagement was examined without specifying a particular type
Learning environment	Fully online	Entirely online learning environments, excluding MOOCs.
	MOOCs	Massive Open Online Courses
	Blended	Combination of online and face-to-face instruction.
	Flipped	A pedagogical approach in which direct instruction is moved from the group learning space to the individual learning space.
School levels	Elementary, middle, high, undergraduate, graduate, adult	Learner population identified in the study
	All	Study included multiple educational levels.
	Not applicable	Educational level was not reported
Research methods	Quantitative, qualitative, mixed methods, learning analytics, action research	Research design or analytical approach explicitly reported by the study
		Qualitative / Constructivist: Phenomenology, Case Study, Narrative etc.
		Quantitative / Positivist: Experimental, Quasi-experimental, Survey etc.
		Mixed Methods / Pragmatic: Explanatory Sequential, Convergent
		Critical / Transformative: Critical Ethnography
		Design-Based: DBR Cycles learning analytics, etc.
		Others: Learning analytics
Independent variables	Individual factors	Learner characteristics or individual-level factors
	Instructor/instructional strategies	Instructor characteristics or instructional approaches

Category	Code	Definition
	Course characteristics	Characteristics of the course or learning context
	Support for learning	Resources or support provided to facilitate learning
	Various	Multiple categories of factors were examined
	Not applicable	No independent variable was identified
Dependent variables	Retention	Continuation/persistence in the course or program
	Course completion	Successful completion of a course or learning activity
	Dropout rate	Withdrawal/non-completion rate
	Not reported	Relevant outcome was not reported
Instructional methods	Game/gamification	Game-based or gamified instructional approaches
	Active learning	Instructional approaches requiring active learner participation
	Course resources	Use of learning resources or materials as part of the instructional approach
	Lecture	Lecture-based instruction
	Asynchronous learning	Asynchronous instructional activities such as narrated videos and online assessments
	Online discussion	Discussion conducted through online platforms
	E-meeting	Synchronous online meetings
	Team project/group work	Collaborative project or group-based activities
	Various	Multiple instructional methods were reported without a single dominant method
	Not reported	Instructional methods were not reported
Country		Country was coded according to the location reported for the study

Table 2

Characteristics of the Included Studies

#	Authors	Years	Country	Research Design	School level	Sample size	Independent Variable	Engagement type	Dependent Variable	Instructional methods/strategies	Learning environment
1	de Freitas et al. (2015)	2015	Australia	Qualitative	Undergraduates	Case study	Course characteristics, instructional strategies	Behavioral engagement	Not reported	Games and play	MOOCs
2	Deng et al. (2020)	2019	China	Quantitative	All	1,452	Individual factors, Course characteristics	Multiple	Course completion	NA	MOOCs
3	Fan et al. (2024)	2024	Australia	Qualitative	Undergraduates	41	Support for learning	Overall engagement	Retention	Weekly narrated videos and assessments with ongoing interaction via online platforms	Blended
4	Gay & Betts (2020)	2020	Jamaica	Action research	Undergraduates	3,386	Instructor/Instructional strategies	Behavioral engagement	Course completion	e-meeting, discussion forums, group works	Fully online
5	Hsu (2025)	2025	Taiwan	Mixed methods	Undergraduates	99	Instructor/Instructional strategies	Overall engagement	Course completion	Gamification	MOOCs
6	Huber et al. (2023)	2023	Austria	Quantitative	NA	296	Instructor/Instructional strategies	Behavioral engagement	Dropout rate	Game	Fully Online
7	Kahn et al. (2017)	2017	UK	Qualitative	Graduate	8	Individual factors	Cognitive engagement	Not reported	Asynchronous online discussions	Online degree program
8	Kuromiya et al. (2022)	2022	Japan	Learning analytics	High school	358	NA	Behavioral engagement	Course completion	Ebook	Fully Online
9	Lan & Hew (2020)	2020	China	Mixed methods	All	693	Various	Multiple	Course completion	Active learning, course resources, instructor attributes;	MOOCs
10	Ortega-Arranz (2019)	2019	Spain	Learning analytics	ALL	648	Instructor/Instructional strategies	Behavioral engagement	Course completion	gamification	MOOCs
11	Padilla Rodriguez	2020	Latin American	Learning analytics	Adult learners	617	Course characteristics	Behavioral engagement	Retention	Not reported	MOOCs

#	Authors	Years	Country	Research Design	School level	Sample size	Independent Variable	Engagement type	Dependent Variable	Instructional methods/strategies	Learning environment
	et al. (2020)		(Mexico, Columbia)								
12	Rosser-Majors et al. (2022)	2022	US	Quantitative	Undergraduates	20 instructors	Instructor/Instructional strategies	Multiple	Course completion	Various	Fully online
13	She et al. (2025)	2025	China	Quantitative	ALL	466	Course characteristics, individual factors	Overall engagement	Retention	NA	MOOCs
14	Soffer, T., & Cohen, A. (2019).	2019	Israel	Learning analytics	Undergraduates	646	Various	Multiple	Course completion	Not reported	Fully online
15	Umer et al. (2017)	2017	China	Learning analytics	NA	40 courses	Individual factors	Behavioral engagement	Retention	Not reported	MOOCs
16	Vo & Ho (2024)	2024	Vietnam	Quantitative	Undergraduates	351	Individual factors	Multiple	Not reported	Not reported	Online degree program
17	Wang et al. (2019)	2019	China	Quantitative	All	2,071,147	Various	Multiple	Dropout rate	Lecture, discussion	MOOCs
18	Yang & Lin (2023)	2023	Taiwan	Quantitative	ALL	300	Individual factors	Overall engagement	Retention intention	NA	MOOCs
19	You (2022)	2022	China	Quantitative	Undergraduates	186	NA	Multiple	Course completion	Not reported	Fully online

Note: "Multiple engagement" indicates that two or more engagement types were discussed together. "Overall engagement" refers to cases in which no specific type of engagement was indicated