Online Learner Engagement in Higher Education: Part 1 – Theory[1]

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Abstract

The level of online learner involvement has a significant impact on the effectiveness and quality of higher education. Online learner engagement, however, is also a complicated, multifaceted idea that has developed through time and been defined and assessed in various ways by various academics and practitioners. In this paper, we aim to provide a comprehensive overview of the theoretical and practical aspects of online learner engagement in higher education. In Part 1, we trace the historical development of the concept of learner engagement from the 19th to the 21st centuries, and examine its current understanding and challenges. We also review some of the most prominent frameworks and models that have been proposed to conceptualize, design, implement, and evaluate online learner engagement. Later, in Part 2, we present some of the best practices and strategies that have been proven to enhance online learner engagement in various disciplines and contexts. We also discuss some of the emerging trends and future directions for research and practice in this field. We hope that this paper will serve as a useful resource for educators, researchers, and policymakers who are interested in improving online learner engagement in higher education.

Keywords: learner engagement, online learning, higher education, educational theory

Yükseköğretimde Çevrimiçi Öğrenci Katılımı: Bölüm 1-Teori

Özet

Çevrimiçi öğrenci katılımının düzeyi, yükseköğretimin etkinliği ve kalitesi üzerinde önemli bir etkiye sahiptir. Bununla birlikte, çevrimiçi öğrenci katılımı, zaman içinde gelişen ve çeşitli akademisyenler ve uygulayıcılar tarafından çeşitli şekillerde tanımlanan ve değerlendirilen karmaşık, çok yönlü bir fikirdir. Bu makalede, yükseköğretimde çevrimiçi öğrenci katılımının teorik ve pratik yönlerine ilişkin kapsamlı bir genel bakış sunmayı amaçlıyoruz. Birinci bölümde, 19. yüzyıldan 21. yüzyıla kadar öğrenci katılımı kavramının tarihsel gelişiminin izini sürüyor ve mevcut anlayışını ve zorluklarını inceliyoruz. Ayrıca, çevrimiçi öğrenci katılımını kavramsallaştırmak, tasarlamak, uygulamak ve değerlendirmek için önerilen en önemli çerçeve ve modellerden bazılarını gözden geçiriyoruz. Daha sonra, Bölüm 2'de, çeşitli disiplinlerde ve bağlamlarda çevrimiçi öğrenci katılımını artırdığı kanıtlanmış en iyi uygulamalardan ve stratejilerden bazılarını sunuyoruz. Ayrıca, bu alanda araştırma ve uygulama için ortaya çıkan bazı eğilimleri ve gelecekteki yönelimleri de tartışıyoruz. Bu makalenin, yükseköğretimde çevrimiçi öğrenci katılımını geliştirmekle ilgilenen eğitimciler, araştırmacılar ve politika yapıcılar için yararlı bir kaynak olacağını umuyoruz.

Anahtar Kelimeler: öğrenci katılımı, çevrimiçi öğrenme, yükseköğretim, eğitim teorisi

Introduction

Online learner engagement is a key factor that influences the quality and effectiveness of higher education. It refers to the degree of involvement, interest, and motivation that learners exhibit in their learning activities, as well as the extent to which they interact with their instructors, peers, and learning materials. Online learner engagement is especially important in the context of distance education, where learners face various challenges such as isolation, distraction, lack of feedback, and technical issues. However, online learner engagement is also a complex and multidimensional concept that has evolved over time and has been defined and measured in different ways by different scholars and practitioners.

In this paper, we aim to provide a comprehensive overview of the theoretical and practical aspects of online learner engagement in higher education. In this Part 1, we trace the

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historical development of the concept of learner engagement and examine its current understanding and challenges. We also review some of the most prominent frameworks and models that have been proposed to conceptualize, design, implement, and evaluate online learner engagement. In the following Part 2, we present some of the best practices and strategies that have been proven to enhance online learner engagement in various disciplines and contexts. We also discuss some of the emerging trends and future directions for research and practice in this field.

Part 1 of this paper focuses on the theoretical foundations and frameworks of online learner engagement. We begin by tracing the evolution of the concept of learner engagement from its origins in the late 19th and early 20th centuries, when it was mainly associated with student attendance and participation in school activities. We then explore how the concept of learner engagement changed in the mid-20th century, when it became more aligned with the cognitive and affective aspects of learning, such as attention, interest, curiosity, and intrinsic motivation. We also examine how the concept of learner engagement further expanded in the late 20th and early 21st centuries, when it incorporated the social and behavioral dimensions of learning, such as collaboration, communication, feedback, and self-regulation. We also highlight some of the challenges and limitations that arise from the diverse and sometimes conflicting definitions and measurements of learner engagement.

Next, we review some of the most influential frameworks and models that have been developed to understand, design, implement, and evaluate online learner engagement in higher education, such as the Engagement-Learning-Engagement-Design framework, the Online Engagement Framework for Higher Education, the Learner Engagement in Blended Learning Environments model, and the Applied Model of Learner Engagement. We also examine the niche Gamification for Student Engagement Framework, and finally explore the role of learning analytics and nudging techniques.

Evolution Of 'Learner Engagement'

The concept of 'learner engagement' has a long and complex history, and it is not easy to pinpoint its exact origin or subsequent evolution, in many cases because the concept of 'learner engagement' developed long before the specific term 'learner engagement.' However, some possible milestones in the development of the concept of learner engagement follow below.

Late 19th and Early 20th Centuries

In the late 19th and early 20th centuries, educational psychologists such as William James, John Dewey, and Jean Piaget emphasized the importance of student interest, motivation, and active involvement in learning. They also proposed theories of learning that involved cognitive, emotional, and social aspects of development. Jean Piaget, for example, was a Swiss psychologist who developed a cognitive developmental theory of learning and intelligence. He believed that children move through four different stages of learning from birth to adolescence, each characterized by a qualitatively different way of thinking and understanding the world. He also proposed that learning is a constructive process that involves the active participation of the learner in exploring and manipulating the environment (Bond, 2012).

Some of the key concepts in Piaget's theory are:

- Schema: This is a mental representation or framework of a concept or action that organizes and guides the learner's perception and behavior. Schemas are constantly modified and refined by the learner's experience and interaction with the environment;
- Adaptation: This is the process of adjusting one's schemas to fit new information and experiences. Adaptation involves two complementary processes: assimilation and accommodation. Assimilation is the incorporation of new information into existing schemas, while accommodation is the modification of existing schemas to accommodate new information;
- Equilibration: This is the state of balance or harmony between one's schemas and one's environment. Equilibration motivates the learner to seek new challenges and experiences that promote cognitive growth and development; and
- Stages of cognitive development: These are four sequential and universal stages that reflect the qualitative changes in the learner's thinking and understanding over time. The stages are: sensorimotor (birth to 2 years), preoperational (2 to 7 years), concrete operational (7 to 11 years), and formal operational (11 years and beyond). Each stage has its own characteristics, limitations, and achievements (Thompson, 2019).

Piaget's theory, especially the elements of adaptation and equilibration, has important implications for education and learner engagement. It suggests that:

- Learning should be matched to the learner's developmental level and readiness, considering their existing schemas and cognitive abilities;
- Learning should be active and discovery-based, allowing learners to construct their own knowledge through exploration and experimentation;
- Learning should be facilitated by providing appropriate guidance, feedback, and scaffolding that support learners' adaptation processes; and
- Learning should be differentiated and individualized, recognizing learners' diversity and uniqueness in their cognitive development.

Mid-20th Century

In the mid-20th century, researchers such as Benjamin Bloom, Jerome Bruner, and Lev Vygotsky further explored the role of cognitive processes, scaffolding, and social interactions in learning. They also introduced concepts such as mastery learning, discovery learning, and zone of proximal development. Lev Vygotsky, for example, was a Russian psychologist who developed a sociocultural theory of learning and development. He believed that social interaction plays a critical role in children's learning, and that learning is a continuous process that is profoundly influenced by culture. He proposed that learning occurs through imitation, guided learning, and collaborative learning, and that social interactions precede individual internalization of information (Nardo, 2021).

Some of the key concepts in Vygotsky's theory are:

- Zone of Proximal Development (ZPD): This is the area of knowledge beyond what an individual currently has but is capable of apprehending with the help of a ‘more knowledgeable other’ (MKO), such as a parent, teacher, peer, or expert. The ZPD represents the potential for learning and development that can be achieved through social interaction and guidance;

- Scaffolding: This is the process of providing a temporary support or framework for learners to achieve a task or goal that is beyond their current ability. Scaffolding can take various forms, such as modeling, questioning, feedback, hints, prompts, etc. Scaffolding is gradually removed as learners gain confidence and competence in the task or goal; and
- Social Learning Theory: This is the idea that learning is a social activity that involves communication, collaboration, and co-construction of knowledge and skills. Social learning theory emphasizes the importance of language, culture, and context in shaping learners' cognitive development and understanding (Nardo, 2021).

Vygotsky's theory has important implications for education and learner engagement. It suggests that:

- Learning should be situated in meaningful and authentic contexts that reflect learners' cultural backgrounds and interests;
- Learning should be interactive and dialogic, involving multiple perspectives and voices;
- Learning should be challenging but achievable, providing learners with opportunities to stretch their abilities and receive appropriate feedback and support;
- Learning should be collaborative and cooperative, fostering learners' sense of belonging and agency.

Late 20th and Early 21st Centuries

In the late 20th and early 21st centuries, researchers such as Alexander Astin, Richard Ryan, Edward Deci, and Mihaly Csikszentmihalyi focused on the factors that influence student engagement, such as involvement, autonomy, competence, relatedness, and flow. They also developed models and measures of engagement that included behavioral, cognitive, emotional, and agentic dimensions.

Of these, one of the theories that continues to form the basis for modern models of learner engagement (see Carroll et al, 2021), is the flow theory of Csikszentmihalyi. According to this theory, flow is a state of optimal experience that occurs when a person is fully immersed and engaged in an activity that is challenging but achievable. Flow is characterized by high concentration, enjoyment, and involvement in the task, as well as a sense of control and mastery. Flow can also inspire peak performance and creativity in various domains, such as art, sports, science, and education.

Csikszentmihalyi identified several factors that contribute to the occurrence of flow, such as:

- A clear goal and immediate feedback;
- A balance between skill level and challenge level;
- A focus on the present moment and the task at hand;
- A loss of self-consciousness and awareness of time; and
- An intrinsic motivation and reward for the activity itself (Csikszentmihalyi, 1990).

Flow theory suggests that people can increase their well-being and happiness by finding and pursuing activities that induce flow in their lives. Flow theory also provides a framework for designing engaging and motivating learning environments that foster students' interest, involvement, and achievement (Reese, 2016).

Early in the twenty-first century, the phrase "learner engagement" was beginning to be used more frequently, particularly when Fredricks et al. (2004) defined it in its contemporary definition and specified each of its four characteristics. Their paradigm states that student engagement is a multidimensional construct that represents how invested and involved students are in their education.

The four dimensions are:

- Behavioral engagement: This refers to the observable actions and conduct of students in the classroom, such as attending, participating, following rules, and completing assignments. Behavioral engagement reflects the degree of effort and persistence that students display in their learning activities;
- Emotional engagement: This refers to the affective reactions and attitudes of students towards their teachers, peers, and schoolwork, such as interest, enjoyment, boredom, anxiety, and anger. Emotional engagement reflects the degree of involvement and identification that students have with their school community;
- Cognitive engagement: This refers to the psychological investment and self-regulation of students in their learning process, such as setting goals, using strategies, seeking feedback, and monitoring progress. Cognitive engagement reflects the degree of challenge and mastery that students pursue in their academic tasks; and
- Agentic engagement: This refers to the proactive contribution and initiative of students in their learning environment, such as asking questions, expressing opinions, making choices, and influencing instruction. Agentic engagement reflects the degree of voice and autonomy that students exercise in their learning context (Fredericks et al, 2004).

The four dimensions of engagement are interrelated and mutually reinforcing, and they can vary depending on the individual, task, and situation. Fredricks et al. (2004) argue that student engagement is a malleable construct that can be influenced by various factors at the individual, classroom, school, and societal levels. Fredricks et al's (2004) dimensions have proven very useful in the field of learner engagement', and have been adopted in their original or adapted versions by a number of the modern frameworks on learner engagement (see, for example, Charland et al, 2015; Redmond et al (2018), which proposes an online learner engagement framework consisting of the five key elements of social engagement, cognitive engagement, collaborative engagement, emotional engagement, and behavioral engagement).

Current Understanding of Learner Engagement

While many disciplines might possibly 'claim' it, learner engagement possibly finds its most appropriate home within the field of educational psychology, where it may be understood as mildly opposite to various learner-centered approaches to education, such as constructivism, etc., rather representing an educator-led approach to learning that seeks to engage and challenge learners at levels that are stimulating, not overwhelming, for them.

Problems with Learner-Centeredness

Various learner-centered approaches to education, while intuitively intending to be stimulating, often in practice actually become overwhelming to learners. This problem was systematically described by Kirschner et al (2006), who reviewed several approaches to education that were intended to stimulate learners and their learning by allowing them to

explore, discover, enquire, and ultimately construct their own knowledge, which in practice had the practical effect of reducing the element of guided instruction, and ultimately reducing learning outcomes (see also Kirschner & van Merriënboer, 2013).

These approaches, and their failures in practice, include:

- The constructivist approach to teaching is based on the premise that cognition (learning) is the result of 'mental construction' and that students learn by fitting new information together with what they already know (Briede, 2014; Bada, 2015). However, research has shown that learners have limited working memory capacity and that cognitive load can be reduced by providing explicit guidance (Paass et al, 2010). In higher education, the constructivist approach has been criticized for being too student-centered and for failing to provide students with the necessary guidance to learn effectively;
- The discovery approach to teaching is an inquiry-based learning method that takes a constructivist approach to education where students are encouraged to construct their own knowledge through a self-directed learning process (Narayanan, 2012; AACSB, 2021). However, research has shown that novices lack the necessary prior knowledge to discover new knowledge on their own. In higher education, the discovery approach has been criticized for being too unstructured and for failing to provide students with the necessary guidance to learn effectively;
- The problem-based approach to teaching is an inquiry-based learning method where learners are presented with a problem and are required to solve it. However, research has shown that learners need prior knowledge to solve problems. In higher education, the problem-based approach has been criticized for being too unstructured and for failing to provide students with the necessary guidance to learn effectively;
- The experiential approach to teaching is based on the premise that learners can learn from experience alone. However, research has shown that learners need explicit guidance to learn from experience[2]. In higher education, the experiential approach has been criticized for being too unstructured and for failing to provide students with the necessary guidance to learn effectively; and
- Finally, the inquiry-based approach to teaching is an inquiry-based learning method where learners are encouraged to generate their own questions and find answers on their own. However, research has shown that learners need explicit guidance to generate effective questions and find answers. In higher education, the inquiry-based approach has been criticized for being too unstructured and for failing to provide students with the necessary guidance to learn effectively (Kirschner et al, 2006).

Cognitive Load Theory

The difference between 'stimulating' learners and inadvertently 'overwhelming' them revolves around the issue of 'cognitive load' (Sweller et al, 2019). Cognitive load theory was introduced in the 1980s as an instructional design theory based on human cognitive architecture, which refers to the structures and functions of human cognition that are relatively stable and invariant across different domains and tasks. The theory assumes that human cognitive architecture consists of a limited-capacity working or short-term memory that can process a few elements of information at a time, and an unlimited long-term memory that stores schemas that vary in their degree of automation. Schemas are cognitive structures

that organise and integrate information into meaningful units, and automation is the process of making schemas more efficient and effortless through practice.

Cognitive load theory suggests that learning occurs when new schemas are constructed or existing schemas are modified in long-term memory. To facilitate this process, instructional design should reduce extraneous cognitive load (caused by ineffective or irrelevant instructional methods), manage intrinsic cognitive load (caused by the inherent complexity of the material), and optimise germane cognitive load (caused by processes that are essential for learning) within Vygotsky's 'zone of proximal development' and through the process of 'scaffolding.'

While never intended to overload the cognitive capacity of learners, the way in which many learner-centered approaches to education were applied in practice resulted in a 'hands off' approach, that minimized the role of the educator and maximized the pressure on the learners to create their own knowledge, often in less structured environments. When the learning tasks and activities were too broad, or too complex, they went beyond the zone of proximal development and overwhelmed the learners' cognitive capacities. Learner engagement, in practice, requires the use of carefully planned, and systematically scaffolded, learning activities, consciously designed by the educator to help learners progress one step at a time in keeping with the cognitive capacities of the learners, whether those learners be in kindergarten or in postgraduate university programmes.

As such, an understanding of cognitive load theory requires educators to design online learning environments that can optimise learners' cognitive processing and facilitate their learning outcomes through engaging learners in their online learning activities in behavioral, emotional, cognitive, and agentic ways.

According to cognitive load theory, online learner engagement can be enhanced by a significantly more involved educator, planning, and carrying out learning activities that involve:

- Reducing extraneous cognitive load by avoiding unnecessary distractions, complexity, or redundancy in online learning materials or tasks;
- Managing intrinsic cognitive load by adjusting the difficulty level, sequencing, pacing, or chunking of online learning materials or tasks according to learners' prior knowledge and abilities;
- Optimising germane cognitive load by providing clear goals, feedback, guidance, scaffolding, examples, or practice opportunities for online learning materials or tasks that require learners to actively construct or modify schemas in long-term memory;
- Using dual-modality presentations (such as text and audio) rather than single-modality presentations (such as text only) to reduce working memory load and increase retention and transfer;
- Fading guidance and support as learners gain expertise to promote self-regulation and autonomy in online learning environments;
- Encouraging imagination or mental rehearsal of online learning materials or tasks to enhance schema construction and automation;

- Managing element interactivity by breaking down complex online learning materials or tasks into simpler components or steps that can be processed by working memory more easily; and
- Promoting collaborative online learning by allowing learners to share their working memory resources with other learners who have complementary skills or knowledge.

Sweller et al (2019) describe several practical principles of cognitive load theory that have been empirically tested and validated over the years, and have been found to have a positive effect on learning, including:

- The worked example effect: learners learn more from studying worked examples than from solving problems;
- The split-attention effect: learners learn more from integrated sources of information than from split sources of information;
- The redundancy effect: learners learn more from essential sources of information than from redundant sources of information;
- The modality effect: learners learn more from dual-modality presentations (such as visual and auditory) than from single-modality presentations (such as visual only);
- The expertise reversal effect: learners with different levels of prior knowledge require different levels of guidance and support;
- The guidance fading effect: learners benefit from gradually reducing the amount of guidance and support as they gain expertise;
- The imagination effect: learners benefit from imagining or mentally rehearsing the steps of a procedure or a solution;
- The element interactivity effect: learners benefit from managing the number and complexity of interacting elements in a task or a material; and
- The collective working memory effect: learners benefit from sharing their working memory resources with other learners in collaborative learning situations.

Learner engagement is thus nowadays a concept that refers to the degree of attention, curiosity, interest, and passion that learners show when they are learning. Engaging learners is important because it increases their attention and focus, motivates them to practice higher-level critical thinking skills, and promotes meaningful learning experiences (Paas & Van Merriënboer, 2020).

Current Nuances in Definitions

However, despite the commonalities in the understanding of the main elements of learner engagement outlined above, there remain nuances to the concept that may be illustrated by a comparison of the views of Lu (2020), Wong & Liem (2021), and Martin and Borup (2022), as discussed below.

Lu (2020) explores the meanings of student engagement in online learning from the perspectives of students who participated in an online course. He defines student engagement as "the extent to which students are involved in their own learning process" (p. 74). He identifies three aspects of student engagement: cognitive (the mental effort invested in learning), emotional (the feelings experienced during learning), and behavioral (the actions performed during learning). According to Lu, a student's view of their own learning experiences determines how engaged they are as learners. He proposes that online learning

environments should give students the chance to interact with teachers and peers who can offer advice and support, as well as to engage in meaningful learning activities that are relevant to their interests and goals.

Wong and Liem (2021) provide a comprehensive review of the current state of the construct of student engagement, its conceptual refinement, and future research directions. They define student engagement as "a multidimensional construct that reflects students' active involvement in learning activities that are relevant for achieving desired academic outcomes" (p. 108). They adopt Fredricks et al's (2004) four dimensions of student engagement: behavioral, emotional, cognitive, and agentic. They also propose a hierarchical model of student engagement that consists of three levels: global, contextual, and situational. They argue that student engagement is influenced by multiple factors at different levels, such as personal characteristics, motivational beliefs, learning strategies, teacher support, peer support, classroom climate, school culture, and educational policies. They suggest that future research should address the theoretical, conceptual, operational, and methodological issues related to student engagement, such as clarifying its definition and measurement, examining its antecedents and consequences, exploring its variability and dynamics, and testing its interventions and applications.

Finally, Martin and Borup (2022) present a reconceptualization of online learner engagement that integrates scholarship from educational technology with scholarship from educational psychology and the learning sciences. They define online learner engagement as "the degree to which learners are cognitively (e.g., thinking), affectively (e.g., feeling), and behaviorally (e.g., doing) involved in online learning activities" (p. 163). They also identify three environmental affordances that influence online learner engagement: communication (the exchange of information between learners and instructors or peers), interaction (the reciprocal influence between learners and instructors or peers), and presence (the perception of being connected with instructors or peers). They argue that online learner engagement is a complex and multidimensional construct that requires a holistic and contextualized approach to understand and support. They suggest that future research should address the research themes and supportive practices related to online learner engagement, such as examining its definitions and measurements, exploring its predictors and outcomes, identifying its challenges and barriers, developing its frameworks and models, designing its strategies and interventions, and evaluating its effectiveness and impact.

The three articles have some similarities in their understanding and definition of learner engagement. For example, they all:

- Agree that learner engagement is a multidimensional construct that involves cognitive, emotional, and behavioral aspects of involvement in learning activities;
- Acknowledge that learner engagement is influenced by various factors at different levels, such as personal characteristics, motivational beliefs, learning strategies, teacher support, peer support, classroom climate, school culture, educational policies, communication, interaction, presence, etc.; and
- Recognise that learner engagement is important for achieving desired academic outcomes, such as learning performance, retention, satisfaction, etc. (see also Rajabalee & Santally, 2021).

However, the three articles also have some nuanced differences in their understanding and definition of learner engagement, in that Lu (2020) proposes a descriptive analysis of student engagement that identifies three aspects of involvement in learning activities (cognitive, emotional, behavioral), while Wong and Liem (2021) propose a hierarchical model of student engagement that consists of three levels, ie global, contextual, and situational, and Martin and Borup (2022) propose a reconceptualization of online learner engagement that considers both critical dimensions of learner engagement and also environmental affordances that influence them (communication, interaction, and presence).

Modern Frameworks for Learner Engagement

In recent years, modern research has sought to apply the existing model of learner engagement in evolving contexts. The existing theories outlined above are generally regarded as being based on solid empirical and theoretical foundations, and have been widely applied and tested in various contexts and domains. They also cover different aspects and dimensions of online learner engagement, such as cognitive, emotional, behavioral, and social engagement; and different factors and facilitators of online learner engagement, such as learner, instructional, technological, and environmental factors. Therefore, there does not appear to be a strong need for a new theory or model or framework that can replace or surpass these existing ones at the moment.

The complexity and diversity of online learner engagement in higher education, particularly in the age of digital technologies and shifting learner needs and expectations, may not be adequately captured by some of the gaps or limits in the existing theories, though. Inconsistencies or contradictions in definitions, operationalizations, measurements, and consequences of online learner engagement may result from some existing theories' failure to fully integrate with or align with one another. Some of the current theories on online learner engagement in higher education may perhaps not fully reflect the most recent research results or best practices, particularly in terms of methods and techniques for boosting online student engagement.

As such, much of the modern research into learner engagement has examined the challenges and opportunities of learner engagement in blended and online learning environments, as well as proposed frameworks and strategies for enhancing engagement with digital technologies. Some of this recent progress has been made by researchers such as Czerkawski & Lyman (2016), Coetzee et al. (2018), Halverson and Graham (2019), Rebensky et al (2020) followed by Carroll et al (2021), Rivera and Palmer Garden (2021), Brown et al. (2021; 2022), Archambault et al (2022), and Kahu et al (2023). Each of these is outlined in more detail below.

Engagement-Learning-Engagement Design-Evaluation

Czerkawski & Lyman (2016) proposed their Engagement-Learning-Engagement Design-Evaluation instructional design framework for fostering student engagement in online learning environments. The authors argue that many existing instructional design models and frameworks are not adequate for addressing the challenges and opportunities of online learning, especially in terms of student engagement. They propose a new framework that integrates the concepts of engagement and learning in a cyclical and iterative process, guided by social cognitive theory and constructivist principles.

The ELEDE framework consists of four main elements: engagement, learning, engagement design, and evaluation. Each element has its own sub-elements and strategies that can be used to enhance student engagement and learning outcomes in online learning environments, summarized as follows:

- Engagement: This is the first element of the framework, which refers to the involvement of students' cognitive and emotional energy to accomplish a learning task. Engagement can be influenced by three factors: individual factors (such as motivation, interest, self-efficacy, etc.), task factors (such as difficulty, feedback, interactivity, etc.), and environmental factors (such as social presence, instructor support, technical quality, etc.). Czerkawski & Lyman (2016) suggest several strategies to increase student engagement based on these factors, such as providing clear goals and expectations, offering choices and autonomy, creating meaningful and authentic tasks, facilitating social interaction and collaboration, providing timely and constructive feedback, ensuring reliable and user-friendly technology, etc.
- Learning: This is the second element of the framework, which refers to the acquisition and application of knowledge and skills in a learning task. Learning can be influenced by three factors: cognitive factors (such as attention, memory, metacognition, etc.), affective factors (such as emotions, attitudes, beliefs, etc.), and behavioral factors (such as participation, effort, persistence, etc.). Czerkawski & Lyman (2016) suggest several strategies to enhance student learning based on these factors, such as activating prior knowledge and schema, using multiple modes and formats of presentation, facilitating self-regulation and reflection, stimulating interest and curiosity, fostering positive emotions and attitudes, encouraging active participation and effort, etc.
- Engagement Design: This is the third element of the framework, which refers to the process of designing online learning environments that foster student engagement and learning. Engagement design can be influenced by three factors: instructional design principles (such as alignment, chunking, sequencing, etc.), instructional design models (such as ADDIE, ASSURE, Dick & Carey's model, etc.), and instructional design tools (such as storyboards, flowcharts, prototypes, etc.). Czerkawski & Lyman (2016) suggest several strategies to improve engagement design based on these factors, such as aligning objectives, activities, and assessments, dividing content into manageable units, sequencing content from simple to complex, using storyboards or flowcharts to visualize the design, creating prototypes or mock-ups to test the design, etc.

- Evaluation: This is the fourth element of the framework, which refers to the process of assessing the effectiveness of online learning environments in terms of student engagement and learning outcomes. Evaluation can be influenced by three factors: evaluation methods (such as formative or summative evaluation), evaluation instruments (such as surveys, questionnaires, tests, etc.), and evaluation criteria (such as engagement indicators, learning indicators, etc.). Czerkawski & Lyman (2016) suggest several strategies to conduct evaluation based on these factors, such as using formative evaluation to monitor and improve the design process, using summative evaluation to measure and report the final results, using multiple sources and methods of data collection, using valid and reliable instruments to measure engagement and learning indicators, using descriptive or inferential statistics to analyze data, etc.

Online Engagement Framework for Higher Education

Coetzee et al (2018) have proposed an Online Engagement Framework for Higher Education, which is a conceptual framework that aims to provide a comprehensive and flexible way to understand and improve online engagement by considering four dimensions: online presence, online participation, online collaboration, and online learning. The definitions or descriptions of each of their four dimensions of online engagement are:

- Online presence: This dimension refers to the extent to which learners and instructors are visible, active, and responsive in the online learning environment. It involves creating and maintaining a sense of connection and belonging among learners and instructors through various cues and modes of communication;
- Online participation: This dimension refers to the extent to which learners and instructors engage in the online learning activities and tasks that are designed to achieve the learning outcomes. It involves being attentive, involved, and motivated to complete the online learning activities and tasks in a timely and effective manner;
- Online collaboration: This dimension refers to the extent to which learners and instructors work together in the online learning environment to co-construct knowledge and share ideas. It involves being cooperative, supportive, and respectful of others' perspectives and contributions in the online learning activities and tasks that require collaboration; and
- Online learning: This dimension refers to the extent to which learners and instructors achieve the intended learning outcomes in the online learning environment. It involves being reflective, critical, and creative in the online learning activities and tasks that require higher-order thinking skills (Coetzee et al, 2018).

According to their framework, each of these four dimensions of online engagement should be applied in practice to promote online learner engagement in higher education by using appropriate and effective strategies and techniques that can elicit or support each dimension. For example:

- Online presence: Strategies and techniques such as using multimedia, personalized, and timely messages; using emoticons, emojis, or gifs; using audio or video feedback; using synchronous or asynchronous tools; and creating or joining online groups or communities;
- Online participation: Strategies and techniques such as using clear, relevant, and meaningful learning objectives; using varied, interactive, and engaging learning activities and tasks; using formative and summative assessments; using rewards, incentives, or recognition; and providing or seeking feedback, guidance, or support;
- Online collaboration: Strategies and techniques such as using collaborative learning theories, models, or frameworks; using collaborative learning tools, platforms, or features; using group formation, management, or evaluation methods; using group roles, norms, or contracts; and facilitating or moderating group discussions, interactions, or conflicts; and
- Online learning: Strategies and techniques such as using cognitive, metacognitive, or affective learning strategies; using scaffolding, modeling, or coaching methods; using problem-based, project-based, or inquiry-based learning approaches; using authentic, real-world, or contextualized learning scenarios; and measuring or demonstrating learning outcomes, achievements, or impacts (Coetzee et al, 2018).

Learner Engagement in Blended Learning Environments

Halverson and Graham (2019) have developed a conceptual framework for Learner Engagement in Blended Learning Environments. They have reviewed the existing literature on learner engagement and identified constructs most relevant to learning in general and blended learning in particular. These are:

- Learner engagement: The involvement of the student's cognitive and emotional energy to accomplish a learning task;
- Cognitive engagement: The degree of challenge and mastery that students pursue in their academic tasks, as well as the psychological investment and self-regulation that they display in their learning process;
- Emotional engagement: The degree of involvement and identification that students have with their school community, as well as the affective reactions and attitudes that they have towards their teachers, peers, and schoolwork;
- Blended learning: A formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home; and
- Technology-mediated learning: Any form of learning that is facilitated or enhanced using technology, such as online learning, mobile learning, computer-based learning, etc.

An approach that incorporates cognitive and emotional measures of engagement, such as attention, interest, enjoyment, and involvement, has also been developed by Halverson and Graham (2019). Their paradigm is predicated on the idea that learner engagement is a multifaceted concept that indicates how invested and active students are in their education. They have proposed two types of indicators that can be used to measure learner engagement: cognitive indicators and emotional indicators:

- Cognitive indicators: These are measures of the mental processes and strategies that students use to acquire, process, and apply information in their learning tasks. Examples of cognitive indicators are: attention, metacognition, self-regulation, strategy use, goal setting, feedback seeking, etc.; and
- Emotional indicators: These are measures of the feelings and emotions that students experience in relation to their learning tasks. Examples of emotional indicators are: interest, enjoyment, boredom, anxiety, anger, etc.

Halverson and Graham (2019) have also provided examples of research measuring these indicators in technology-mediated learning contexts. Some of these examples include:

- Attention: This is the degree of focus and concentration that students devote to their learning tasks. One way to measure attention is by using eye-tracking devices or software that can capture the gaze patterns and fixation durations of students while they interact with online content or instruction;
- Interest: This is the degree of curiosity and intrinsic motivation that students have for their learning tasks. One way to measure interest is by using self-report surveys or

questionnaires that can assess the situational or individual interest of students in relation to specific topics or activities;

- Enjoyment: This is the degree of pleasure and satisfaction that students derive from their learning tasks. One way to measure enjoyment is by using physiological sensors or devices that can detect the emotional arousal and valence of students based on their heart rate, skin conductance, facial expressions, etc.;
- Metacognition: This is the degree of awareness and control that students have over their own thinking and learning processes. One way to measure metacognition is by using think-aloud protocols or interviews that can elicit the verbal reports or reflections of students on their cognitive strategies or difficulties;
- Self-regulation: This is the degree of planning, monitoring, and adjusting that students do to achieve their learning goals. One way to measure self-regulation is by using trace data or logs that can capture the actions and behaviors of students while they interact with online content or instruction;
- Strategy use: This is the degree of selection and application of effective cognitive strategies that students use to enhance their learning outcomes. One way to measure strategy use is by using performance assessments or tasks that can evaluate the quality or accuracy of students' responses or products;
- Goal setting: This is the degree of setting specific, challenging, and attainable goals that students have for their learning tasks. One way to measure goal setting is by using self-report surveys or questionnaires that can assess the type, level, and source of goals that students have for themselves; and
- Feedback seeking: This is the degree of soliciting and using feedback from various sources (such as teachers, peers, systems) to improve one's performance or understanding. One way to measure feedback seeking is by using trace data or logs that can capture the frequency and type of feedback requests or interactions that students have with online content or instruction.

Applied Model of Learner Engagement

Rebensky et al (2020), further developed by Carroll et al. (2021), propose an Applied Model of Learner Engagement that explains how individual, task and environmental factors affect the likelihood of a student becoming engaged in learning content. They suggest that these factors can be manipulated to create optimal conditions for engagement, which is defined as a state of high concentration, enjoyment, and involvement in learning. More detail of each of these three factors includes:

- Individual factors: These are the characteristics or traits of the learner that influence their likelihood of becoming engaged in learning content. Examples of individual factors are motivation, interest, self-efficacy, personality, learning style, prior knowledge, etc. Carroll et al (2021) have proposed four types of individual factors that are relevant to gamification: intrinsic motivation, extrinsic motivation, positive affect, and negative affect;
    - Intrinsic motivation: This is the degree of engaging in an activity for its own sake, because it is enjoyable, interesting, or satisfying. Intrinsic motivation can be enhanced by game attributes that provide autonomy, competence, and relatedness to the learner;

  - Extrinsic motivation: This is the degree of engaging in an activity for external rewards or outcomes, such as grades, recognition, or money. Extrinsic motivation can be enhanced by game attributes that provide feedback, rewards, and incentives to the learner;
  - Positive affect: This is the degree of experiencing positive emotions or feelings in relation to an activity, such as joy, excitement, or curiosity. Positive affect can be enhanced by game attributes that provide novelty, challenge, and aesthetics to the learner;
  - Negative affect: This is the degree of experiencing negative emotions or feelings in relation to an activity, such as boredom, frustration, or anxiety. Negative affect can be reduced by game attributes that provide support, guidance, and flexibility to the learner;
- Task factors: These are the features or elements of the learning task that influence the likelihood of a student becoming engaged in learning content. Examples of task factors are difficulty, feedback, interactivity, relevance, etc. Carroll et al (2021) have suggested task-level ten instructional interventions that can be used to increase learner engagement in the modern educational environment:
  - Personalization: This is the degree of tailoring the learning content or process to the individual preferences or needs of the learner. Personalization can increase learner engagement by enhancing their intrinsic motivation and positive affect;
  - Gamification: This is the degree of applying game attributes to non-game situations, such as learning contexts. Gamification can increase learner engagement by enhancing their intrinsic motivation and positive affect;
  - Scaffolding: This is the degree of providing temporary support or guidance to help learners achieve a task or goal that is beyond their current ability. Scaffolding can increase learner engagement by enhancing their competence and reducing their negative affect;
  - Adaptive learning: This is the degree of adjusting the learning content or process based on the individual performance or progress of the learner. Adaptive learning can increase learner engagement by enhancing their competence and providing optimal challenge;
  - Collaborative learning: This is the degree of involving learners in working together with others to achieve a common goal or outcome. Collaborative learning can increase learner engagement by enhancing their relatedness and providing social presence;
  - Problem-based learning: This is the degree of engaging learners in solving authentic and ill-structured problems that require higher-order thinking skills. Problem-based learning can increase learner engagement by enhancing their relevance and providing cognitive challenge;
  - Inquiry-based learning: This is the degree of engaging learners in exploring questions or phenomena that spark their curiosity and interest. Inquiry-based learning can increase learner engagement by enhancing their relevance and providing cognitive challenge;
  - Experiential learning: This is the degree of engaging learners in hands-on activities that involve direct experience and reflection. Experiential learning can increase learner engagement by enhancing their relevance and providing sensory stimulation;

  - Storytelling: This is the degree of using narratives or stories to convey information or meaning. Storytelling can increase learner engagement by enhancing their interest and providing emotional stimulation;
  - Multimedia: This is the degree of using multiple modes or formats to present information or content. Multimedia can increase learner engagement by enhancing their interest and providing sensory stimulation; and
- Environmental factors: These are the features or elements of the learning environment that influence the likelihood of a student becoming engaged in learning content. Examples of environmental factors are social presence, instructor support, technical quality, etc. Carroll et al (2021) have proposed three types of environmental factors that are relevant to mobile and online technology: social presence (the degree of feeling connected with others in a virtual environment), instructor support (the degree of receiving guidance and feedback from an instructor in a virtual environment), and technical quality (the degree of having reliable and user-friendly technology in a virtual environment).

Rebensky (2020) and Carroll et al's (2021) model shows how individual factors interact with task factors and environmental factors to influence learner engagement and learning outcomes in mobile and online technology contexts. The model also shows how these relationships can be moderated by feedback loops (such as reinforcement or adaptation).

Gamification for Student Engagement Framework

Rivera and Palmer Garden (2021) have proposed a niche Gamification for Student Engagement Framework, a conceptual framework that aims to guide practitioners to systematically design gamified learning experiences that foster student engagement by using appropriate and effective game attributes according to the desired student experience and consequence of engagement. The framework consists of four components: game attributes, student experience, student engagement, and learning outcomes:

- Game attributes: These are the features or elements of games that can be applied to non-game situations, such as learning contexts, to create a gamified experience. Examples of game attributes are points, badges, leaderboards, levels, challenges, feedback, rewards, etc. Rivera and Palmer Garden have identified 12 game attributes that are commonly used in gamification literature and practice;
- Student experience: This is the psychological state or response that students have as a result of interacting with game attributes in a learning context. Examples of student experience are motivation, interest, enjoyment, curiosity, etc. Rivera and Palmer Garden have proposed four types of student experience that are relevant to gamification: intrinsic motivation, extrinsic motivation, positive affect, and negative affect;
- Student engagement: This is the multidimensional construct that reflects the extent to which students are involved and invested in their learning and schooling. Examples of student engagement are attention, participation, effort, persistence, etc. Rivera and Palmer Garden have adopted the four dimensions of student engagement proposed by Fredricks et al. (2004): behavioral engagement, emotional engagement, cognitive engagement, and agentic engagement. These dimensions include, for example:
  - Cognitive engagement: Game attributes such as goals, rules, feedback, challenge, and progression can elicit or support cognitive engagement by providing structure, guidance, challenge, and feedback for learners to focus on the learning content or

task, activate prior knowledge, apply strategies, monitor progress, and reflect on outcomes;
    - Emotional engagement: Game attributes such as aesthetics, narrative, humor, surprise, and rewards can elicit or support emotional engagement by providing stimulation, interest, curiosity, enjoyment, satisfaction, or pride for learners to feel positive or meaningful emotions during or after the learning content or task;
    - Behavioral engagement: Game attributes such as interactivity, agency, choice, and autonomy can elicit or support behavioral engagement by providing opportunities, options, and control for learners to actively participate, explore, experiment, and customize the learning content or task; and
    - Social engagement: Game attributes such as collaboration, competition, cooperation, and communication can elicit or support social engagement by providing interaction, connection, and support for learners to work with, compete with, or help others in the learning content or task.
- Learning outcomes: These are the measurable results or consequences of students' learning process. Examples of learning outcomes are: academic achievement, retention, satisfaction, etc. Rivera and Palmer Garden have suggested three types of learning outcomes that can be influenced by gamification, namely cognitive outcomes, affective outcomes, and behavioral outcomes.

Rivera and Palmer Garden's (2021) framework shows how game attributes can influence student experience, which in turn can influence student engagement, which in turn can influence learning outcomes. The framework also shows how these relationships can be moderated by individual differences (such as personality traits or learning styles), contextual factors (such as subject matter or instructional design), and feedback loops (such as reinforcement or adaptation).

Pillars of Online Pedagogy

Focusing on online pedagogy in general, Archambault et al (2022) propose a framework for teaching in online learning environments, based on five pillars of online pedagogy that are grounded in the principles of learner-centeredness, constructivism and situated learning. Their pillars, however, have clear implications for the issue of learner engagement. A brief explanation of each pillar follows below:

- Build Relationships and Community: This pillar emphasizes the importance of creating a sense of belonging, trust and social presence among online learners and instructors, as well as fostering collaborative learning and peer support. This pillar is relevant to online learner engagement because it can enhance learners' motivation, satisfaction, and retention in online courses;
- Incorporate Active Learning: This pillar highlights the need for designing online learning activities that are interactive, authentic, challenging, and meaningful, and that require learners to apply their knowledge and skills in various contexts. This pillar is relevant to online learner engagement because it can promote learners' cognitive, behavioral, and emotional involvement in online learning processes;
- Leverage Learner Agency: This pillar advocates for giving online learners more choice, autonomy and control over their own learning goals, strategies, and outcomes, as well as providing them with feedback and guidance. This pillar is relevant to online learner

engagement because it can foster learners' self-regulation, self-efficacy, and intrinsic motivation in online learning environments;

- Embrace Mastery Learning: This pillar suggests that online learning should be aligned with clear and specific learning objectives, criteria and standards, and that online learners should be given multiple opportunities to practice, revise and demonstrate their mastery of the content and skills. This pillar is relevant to online learner engagement because it can enhance learners' achievement, confidence, and persistence in online learning tasks; and
- Personalize the Learning Process: This pillar recommends that online learning should be tailored to the individual needs, preferences, and interests of each learner, as well as considering their prior knowledge, experiences, and backgrounds. This pillar is relevant to online learner engagement because it can increase learners' relevance, interest, and enjoyment in online learning activities.

Learning Analytics and Nudging Techniques

Finally, in a 3-year long collaborative effort, Brown et al (2021), Brown et al (2022), and Kahu et al (2023) have proposed a conceptual framework for learner engagement involving Learning Analytics and Nudging Techniques. They suggest that learning analytics can be used to promote online learner engagement by providing data and insights on learners' behaviors, actions, and interactions in the online learning environment; identifying patterns, trends, and anomalies in learners' engagement; and informing and guiding interventions and feedback to support learners' engagement. They propose a conceptual framework that combines learning analytics with nudging techniques to enhance student online learning and engagement in higher education (Brown et al, 2021; see also Silvola et al, 2021).

Nudging techniques are methods or strategies that use subtle cues or prompts to influence learners' decisions or behaviors without coercion or restriction. They are based on the principles of behavioral economics and nudge theory, which suggest that people's choices are often influenced by cognitive biases, heuristics, and social norms. Nudging techniques aim to help learners make better choices or adopt desirable behaviors that can benefit their learning outcomes and well-being. For example:

- Reminders: These are nudges that remind learners of their goals, tasks, deadlines, or resources that can help them complete their online learning activities.
- Recommendations: These are nudges that suggest learners what to do next, what to focus on, or what to avoid based on their previous actions, progress, or performance.
- Incentives: These are nudges that reward learners for their achievements, efforts, or behaviors that can enhance their online learning engagement.
- Social proofs: These are nudges that show learners what others are doing, thinking, or feeling in the online learning environment to influence their social norms, expectations, or motivations (Brown et al, 2022).

In their most recent update, Kahu et al. (2023) provide a conceptual framework that combines course learning analytics (CLA) and nudging strategies to enhance student online learning and engagement. The authors define CLA as the collection, analysis and reporting of data about student behaviors, emotions, and cognition in online courses, and nudging as the use of subtle cues or prompts to influence student choices and actions in online learning environments. The authors argue that CLA and nudging can be used more effectively to engage students if

they are informed by the theoretical perspectives of communication and critical literacies, which emphasize the importance of clear, respectful, and empowering communication between students and academics.

The authors propose a framework that consists of four elements: expectation management, engagement principles, CLA indicators and nudging strategies. The framework is designed to guide academics in using CLA and nudging to support both students' and academics' engagement in online courses. The framework suggests that academics should:

- Manage expectations by providing clear and consistent information about the course structure, content, assessment, and support services, as well as encouraging students to reflect on their own expectations and goals for online learning;
- Apply engagement principles by creating a supportive, inclusive, and respectful online learning community, as well as fostering cognitive, affective, and behavioral engagement among students;
- Use CLA indicators by collecting and analyzing data on student behaviors (such as login frequency, time spent online, participation in activities), emotions (such as satisfaction, anxiety, boredom) and cognition (such as performance, feedback, self-regulation) in online courses; and
- Implement nudging strategies by providing timely, personalized, and actionable feedback to students based on CLA indicators, such as reminders, encouragements, suggestions, warnings, or rewards.

Kahu et al (2023) discuss the ethical implications of using CLA and nudging in online education, such as privacy, consent, transparency, and autonomy. They also provide some examples of how the framework can be applied in practice, such as using automated emails or text messages to nudge students based on their CLA indicators. They conclude by highlighting the potential benefits of the framework for enhancing student online learning and engagement, as well as suggesting some directions for future research and practice.

Conclusion

In this paper, we have provided a comprehensive overview of the theoretical and practical aspects of online learner engagement in higher education. We have traced the historical development of the concept of learner engagement and examined its current understanding and challenges. We have also reviewed some of the most prominent frameworks and models that have been proposed to conceptualize, design, implement, and evaluate online learner engagement.

We believe that online learner engagement is a crucial factor that can improve the quality and effectiveness of higher education, especially in the context of distance education. We also acknowledge that online learner engagement is a complex and multidimensional concept that requires further exploration and refinement. We hope that this paper, covering the theory, has contributed to the advancement of knowledge and practice in online learner engagement in higher education.

The practical applications of the concept of ‘learner engagement,’ particularly in terms of incorporating strategies related to learner engagement into course design, educational techniques that promote online learner engagement in day-to-day practice, gamification, and

simulations, and also the measurement principles and instruments of online learner engagement, follow next in Part 2 of this article.

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Author Contributions

All of the authors have contributed equally to this article.

Conflict of Interest

The authors declare there is no conflict of interest in this study.

Funding

The authors has not received funding from any institution for this article.