

Online Learner Engagement in Higher Education: Part 2 – Practice¹

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Abstract

Online learner engagement is a key factor for the quality and effectiveness of online education. It refers to the degree of involvement, participation, and interest that students show in their online courses and how they interact with the content, the instructor, and their peers. However, engaging online learners can be challenging due to the lack of physical presence, social cues, and immediate feedback that are often present in face-to-face settings. Therefore, it is important for online educators and researchers to understand the factors that influence online learner engagement and the educational techniques that can enhance it. This paper discusses the factors that influence online learner engagement, such as technology and interface characteristics, content area experience, student roles and instructional tasks, information overload, transactional distance, e-learning capital, perceived usefulness, computer self-efficacy, motivational beliefs, and learning strategies. It also reviews the educational techniques that can enhance online learner engagement, such as social engagement, cognitive engagement, behavioral engagement, collaborative engagement, and emotional engagement. Moreover, it explores the gamification and simulation techniques that can also enhance online learner engagement by providing interactive and immersive learning experiences. Finally, it examines the methods and instruments for measuring online learner engagement, such as self-reports, behavioral logs, physiological measures, learning analytics, observation and feedback, and various scales and surveys. The paper concludes with a summary of the main findings and implications for online education practice and research, and identifies some gaps in the existing literature and suggests some directions for future research.

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

Yükseköğretimde Çevrimiçi Öğrenci Katılımı: Bölüm 1-Teori

Özet

Çevrimiçi öğrenci katılımı, çevrimiçi eğitimin kalitesi ve etkinliği için kilit bir faktördür. Öğrencilerin çevrimiçi kurslarına gösterdikleri katılım, ilgi ve alakanın derecesini ve içerikle, öğretmenle ve akranlarıyla nasıl etkileşime girdiklerini ifade eder. Ancak, yüz yüze ortamlarda genellikle mevcut olan fiziksel mevcudiyet, sosyal ipuçları ve anında geri bildirim eksikliği nedeniyle çevrimiçi öğrencilerin ilgisini çekmek zor olabilir. Bu nedenle, çevrimiçi eğitimciler ve araştırmacılar için çevrimiçi öğrenen katılımını etkileyen faktörleri ve bunu artırabilecek eğitim tekniklerini anlamak önemlidir. Bu makale, teknoloji ve arayüz özellikleri, içerik alanı deneyimi, öğrenci rolleri ve öğretim görevleri, aşırı bilgi yükü, işlemsel mesafe, e-öğrenme sermayesi, algılanan kullanılabilirlik, bilgisayar öz yeterliliği, motivasyonel inançlar ve öğrenme stratejileri gibi çevrimiçi öğrenci katılımını etkileyen faktörleri tartışmaktadır. Ayrıca, sosyal katılım, bilişsel katılım, davranışsal katılım, işbirlikçi katılım ve duygusal katılım gibi çevrimiçi öğrenen katılımını artırabilecek eğitim tekniklerini de gözden geçirmektedir. Ayrıca, etkileşimli ve sürükleyici öğrenme deneyimleri sağlayarak çevrimiçi öğrenen katılımını artırabilecek oyunlaştırma ve simülasyon tekniklerini de araştırmaktadır. Son olarak, öz raporlar, davranışsal kayıtlar, fizyolojik ölçümler, öğrenme analitiği, gözlem ve geri bildirim ve çeşitli ölçekler ve anketler gibi çevrimiçi öğrenen katılımını ölçme yöntemlerini ve araştırmalarını incelemektedir. Çalışma, çevrimiçi eğitim uygulamaları ve araştırmaları için ana bulguların ve çıkarımların bir özeti ile sonuçlanmakta, mevcut literatürdeki bazı boşlukları belirlemekte ve gelecekteki araştırmalar için bazı yönler önermektedir.

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

Introduction

Online learner engagement is a key factor for the quality and effectiveness of online education. It refers to the degree of involvement, participation, and interest that students show in their online courses and how they interact with the content, the instructor, and their peers. Online learner engagement can influence students' motivation, satisfaction, retention,

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and academic achievement. However, engaging online learners can be challenging due to the lack of physical presence, social cues, and immediate feedback that are often present in face-to-face settings. Therefore, it is important for online educators and researchers to understand the factors that influence online learner engagement and the educational techniques that can enhance it.

This paper follows its first half, 'Online learner engagement in higher education: Part 1 – Theory'. Building on the theories and frameworks already covered there, this paper now aims to provide a comprehensive review and synthesis of multiple articles on online learner engagement in higher education, written in a purposeful, bullet-point style suitable for busy practitioners. It is divided into four main sections. The first section discusses the factors that influence online learner engagement, such as technology and interface characteristics, content area experience, student roles and instructional tasks, information overload, transactional distance, e-learning capital, perceived usefulness, computer self-efficacy, motivational beliefs, and learning strategies. The second section reviews the educational techniques that can enhance online learner engagement, such as social engagement, cognitive engagement, behavioral engagement, collaborative engagement, and emotional engagement. The third section explores the gamification and simulation techniques that can also enhance online learner engagement by providing interactive and immersive learning experiences. The fourth section examines the methods and instruments for measuring online learner engagement, such as self-reports, behavioral logs, physiological measures, learning analytics, observation and feedback, and various scales and surveys.

Factors Influencing Online Learner Engagement

A wide variety of factors have been found to influence the levels of learner engagement in online education, especially within the higher education context. Some of these include:

Technology and Interface Characteristics

The design, functionality, accessibility, and usability of the online learning platforms and tools can affect online learners' engagement by facilitating or hindering their interaction, communication, and participation in online learning activities (Huang et al., 2016; Juliantara et al., 2022; Liu et al., 2007).

- Interaction refers to the degree to which online learners can manipulate, control, and respond to the online learning content and activities. For example, online learners may be more engaged if they can use interactive features such as simulations, games, quizzes, or animations that allow them to explore, experiment, or practice the online learning material.
- The ability of online learners to communicate with teachers or their classmates in online learning settings is referred to as communication. For example, online learners may be more engaged if they can use communication tools such as chat rooms, discussion boards,

video conferences, or social media that enable them to ask questions, share opinions, or collaborate with others.

- The ability of online learners to actively participate in the activities and material of online learning is referred to as participation. For example, online learners may be more engaged if they can use participation tools such as polls, surveys, blogs, or portfolios that allow them to express their views, reflect on their learning, or showcase their work (McKinsey, 2020; Dumford & Miller, 2018; Kara, 2021).

Content Area Experience

The level of familiarity, interest, and relevance of the online learning content can affect online learners' engagement by influencing their motivation, curiosity, and cognitive load in online learning processes (Juliantara et al., 2022; Lee et al., 2019; Lu, 2020).

- Motivation refers to the reasons and goals that drive online learners to engage in online learning activities. It can be influenced by intrinsic factors (such as interest, enjoyment, or challenge) or extrinsic factors (such as rewards, grades, or recognition). Content area experience can affect online learners' motivation by affecting their perceived value and expectancy of the online learning content. For example, online learners may be more motivated if they find the online learning content relevant to their personal or professional interests and goals, or if they have some prior knowledge or experience that makes them confident in their ability to learn the online learning content.
- The term 'curiosity' refers to the desire and readiness to investigate and pick up new knowledge and abilities. It can be influenced by novelty (the degree to which the online learning content is new or surprising), complexity (the degree to which the online learning content is rich or diverse), and ambiguity (the degree to which the online learning content is unclear or uncertain). Content area experience can affect online learners' curiosity by affecting their perceived interest and challenge of the online learning content. For example, online learners may be more curious if they encounter some gaps or inconsistencies in their existing knowledge or experience that make them want to learn more about the online learning content, or if they are exposed to some intriguing questions or problems that stimulate their thinking and creativity.
- The volume and complexity of information that online learners must process in their working memory during online learning activities is referred to as cognitive load. It can be influenced by intrinsic load (the inherent difficulty of the online learning content), extraneous load (the unnecessary distraction or confusion caused by the presentation or delivery of the online learning content), and germane load (the beneficial processing and organisation of the online learning content into long-term memory). Content area experience can affect online learners' cognitive load by affecting their perceived difficulty and clarity of the online learning content. For example, online learners may experience lower cognitive load if they have some

prior knowledge or experience that helps them understand and organise the online learning content more easily, or if they receive some clear guidance and feedback that helps them focus and monitor their learning progress (UCL, 2021; Dumford & Miller, 2018; McKinsey, 2020).

Student Roles and Instructional Tasks

The expectations, responsibilities, and autonomy of online learners as well as the types, formats, and complexity of the online learning tasks can affect online learners' engagement by shaping their behavioral, emotional, and cognitive involvement in online learning activities (Huang et al., 2016; Juliantara et al., 2022; Liu et al., 2007).

- Behavioral involvement refers to the degree to which online learners participate, interact, and collaborate in online learning activities. It can be influenced by the clarity, relevance, and alignment of the online learning tasks with the learning objectives and outcomes. Student roles and instructional tasks can affect online learners' behavioral involvement by affecting their perceived purpose and value of the online learning tasks. For example, online learners may be more behaviorally involved if they are given clear and meaningful online learning tasks that are aligned with their learning goals and expectations, or if they are given some choice and autonomy over the online learning tasks that suit their preferences and needs.
- The level of pleasant or negative emotions experienced by online learners when participating in learning activities is referred to as emotional involvement. It can be influenced by the challenge, feedback, and support of the online learning tasks. Student roles and instructional tasks can affect online learners' emotional involvement by affecting their perceived difficulty and feedback of the online learning tasks. For example, online learners may experience more positive emotions such as enjoyment, satisfaction, or pride if they are given challenging but achievable online learning tasks that match their level of ability and provide them with timely and constructive feedback, or if they are given some emotional support and encouragement from instructors or peers during the online learning tasks.
- The term 'cognitive involvement' refers to how deeply and purposefully online learners process the lessons and activities they are completing. It can be influenced by the novelty, complexity, and interactivity of the online learning tasks. Student roles and instructional tasks can affect online learners' cognitive involvement by affecting their perceived interest and challenge of the online learning tasks. For example, online learners may engage more cognitively if they are given novel and complex online learning tasks that stimulate their curiosity and creativity, or if they are given some opportunities for interaction and collaboration with instructors or peers during the online learning tasks (UCL, 2021; Hrastinski et al., 2018; Kahn et al., 2017).

Opportunities within online courses for learner engagement, where activities or tasks are both meaningful from the educator's perspective and engaging from the learner's perspective, are known as 'pedagogical touchpoints' (Tualaulelei et al., 2022).

Information Overload

The amount, diversity, and quality of the online learning information and resources can affect online learners' engagement by affecting their attention, comprehension, and retention in online learning environments (Huang et al., 2016; Juliantara et al., 2022; Liu et al., 2007).

- Attention refers to the degree to which online learners can focus and sustain their concentration on the online learning content and activities. It can be influenced by the relevance, novelty, and salience of the online learning information and resources. Information overload can affect online learners' attention by affecting their perceived importance and interest of the online learning information and resources. For example, online learners may pay more attention if they are given a manageable and relevant amount of online learning information and resources that are aligned with their learning objectives and outcomes, or if they are given some cues and highlights that draw their attention to the key points or features of the online learning information and resources.
- The degree to which online learners can comprehend and analyze the lessons and activities is referred to as comprehension. It can be influenced by the clarity, coherence, and consistency of the online learning information and resources. Information overload can affect online learners' comprehension by affecting their perceived difficulty and clarity of the online learning information and resources. For example, online learners may comprehend more if they are given a clear and coherent presentation of the online learning information and resources that are organised and structured in a logical and meaningful way, or if they are given some explanations and examples that illustrate or demonstrate the concepts or skills of the online learning information and resources.
- The term 'retention' describes how well online learners can retain and recollect the lessons they have learned there. It can be influenced by the repetition, elaboration, and integration of the online learning information and resources. Information overload can affect online learners' retention by affecting their perceived repetition and elaboration of the online learning information and resources. For example, online learners may retain more if they are given some opportunities for repetition and review of the online learning information and resources that reinforce their memory and recall of the learned material, or if they are given some opportunities for elaboration and integration of the online learning information and resources that deepen their understanding and application of the learned material (UCL, 2021; Dumford & Miller, 2018; McKinsey, 2020).

Transactional Distance

The psychological and communication distance between online learners and instructors or peers that is influenced by the structure, dialogue, and autonomy of the online learning course can affect online learners' engagement by impacting their sense of presence, belonging, and support in online learning communities (Fabian et al., 2022; Moore, 1993; Tang et al., 2023).

- Presence refers to the degree to which online learners feel connected and involved with instructors or peers in online learning environments. It can be influenced by the frequency, quality, and immediacy of the communication and interaction that occur in the online learning course. Transactional distance can affect online learners' presence by affecting their perceived social and cognitive connection with instructors or peers. For example, online learners may feel more presence if they have frequent and high-quality communication and interaction with instructors or peers that are responsive, empathetic, and constructive, or if they use various communication tools such as video, audio, or text that convey verbal and non-verbal cues.
- The degree to which online students feel appreciated and accepted by their classmates or teachers in online learning environments is referred to as belonging. It can be influenced by the degree of similarity, diversity, and inclusivity that exist in the online learning course. Transactional distance can affect online learners' belonging by affecting their perceived social and academic fit with instructors or peers. For example, online learners may feel more belonging if they have some similarity and diversity with instructors or peers that reflect their backgrounds, interests, or goals, or if they experience some inclusivity and respect from instructors or peers that acknowledge their contributions, perspectives, or needs.
- The term 'support' describes the level of academic and emotional support provided by peers or instructors in online learning environments. It can be influenced by the availability, quality, and timeliness of the guidance, feedback, and encouragement that are provided in the online learning course. Transactional distance can affect online learners' support by affecting their perceived academic and emotional help from instructors or peers. For example, online learners may receive more support if they have easy access to and high quality of guidance, feedback, and encouragement from instructors or peers that are clear, constructive, and timely, or if they use various support resources such as tutorials, FAQs, or forums that offer additional information, advice, or tips (Fabian et al., 2022; Martin et al., 2022; Paulsen & McCormick, 2020; Lazareva, 2017).

E-learning Capital

The access to and ability to use the online learning infrastructure, resources, and ecosystem can affect online learners' engagement by enabling or constraining their participation,

collaboration, and self-regulation in online learning settings (Fabian et al., 2022; Selwyn & Facer, 2013; Wang & Wang, 2009).

- Participation refers to the degree to which online learners can access and complete the online learning content and activities. It can be influenced by the availability, quality, and compatibility of the online learning infrastructure and resources that are needed or provided for online learners. E-learning capital can affect online learners' participation by affecting their perceived ease and convenience of accessing and using the online learning infrastructure and resources. For example, online learners may participate more if they have easy access to and high quality of online learning infrastructure and resources that are reliable, secure, and user-friendly, or if they have compatible devices, software, and internet connection that support their online learning needs and preferences.
- The ability of online students to communicate and work together with peers or instructors is referred to as collaboration. It can be influenced by the availability, quality, and diversity of the online learning tools and platforms that are needed or provided for online learners. E-learning capital can affect online learners' collaboration by affecting their perceived ease and convenience of accessing and using the online learning tools and platforms. For example, online learners may collaborate more if they have easy access to and high quality of online learning tools and platforms that are responsive, interactive, and engaging, or if they have diverse options of communication modes such as text, audio, or video that suit their preferences and needs.
- The term 'self-regulation' describes how well an online learner can organize, keep track of, and manage their own learning activities and results in an online learning environment. It can be influenced by the availability, quality, and feedback of the online learning ecosystem that is needed or provided for online learners. E-learning capital can affect online learners' self-regulation by affecting their perceived ease and convenience of accessing and using the online learning ecosystem. For example, online learners may self-regulate more if they have easy access to and high quality of online learning ecosystem that is organised, structured, and supportive, or if they receive timely and constructive feedback from instructors, peers, or systems that help them track, evaluate, and improve their learning progress (Fabian et al., 2022; McKinsey, 2020; Dumford & Miller, 2018).

Perceived Usefulness

The perceived value and benefit of the online learning environment for achieving desired learning outcomes can affect online learners' engagement by influencing their attitude, intention, and behavior in online learning contexts (Davis et al., 1989; Dubey et al., 2023; Fabian et al., 2022).

- Attitude refers to the degree to which online learners have positive or negative feelings or evaluations toward the online learning environment. It can be influenced by the

perceived ease of use, enjoyment, and quality of the online learning environment. Perceived usefulness can affect online learners' attitude by affecting their perceived satisfaction and preference of the online learning environment. For example, online learners may have more positive attitude if they perceive the online learning environment as useful for enhancing their learning performance, productivity, or effectiveness, or if they prefer the online learning environment over other alternatives.

- Intention refers to the degree to which online learners have plans or goals to use or continue using the online learning environment. It can be influenced by the perceived relevance, value, and expectancy of the online learning environment. Perceived usefulness can affect online learners' intention by affecting their perceived motivation and commitment to the online learning environment. For example, online learners may have more intention if they perceive the online learning environment as relevant for meeting their learning needs, interests, or goals, or if they value the benefits and outcomes of using the online learning environment.

- Behavior refers to the degree to which online learners actually use or continue using the online learning environment. It can be influenced by the perceived ease of access, use, and support of the online learning environment. Perceived usefulness can affect online learners' behavior by affecting their perceived ability and opportunity to use the online learning environment. For example, online learners may use more or continue using the online learning environment if they perceive it as easy to access, use, and get support from instructors, peers, or systems, or if they have sufficient resources, time, and conditions to use the online learning environment (Sun et al., 2022; Fabian et al., 2022; Martin & Bolliger, 2022).

Computer Self-efficacy

The confidence and competence in using computers and digital technologies for online learning purposes can affect online learners' engagement by affecting their anxiety, satisfaction, and performance in online learning activities (Alsubhi et al., 2019; Compeau & Higgins, 1995; Fabian et al., 2022).

- Anxiety refers to the degree to which online learners experience fear or nervousness when using computers and digital technologies for online learning purposes. It can be influenced by the perceived difficulty, risk, and uncertainty of using computers and digital technologies for online learning purposes. Computer self-efficacy can affect online learners' anxiety by affecting their perceived control and coping ability when using computers and digital technologies for online learning purposes. For example, online learners may experience less anxiety if they have high computer self-efficacy that makes them confident and competent in using computers and digital technologies for online learning purposes, or if they have some strategies and resources to overcome any difficulties or challenges that they may encounter when using computers and digital technologies for online learning purposes.

- Satisfaction refers to the degree to which online learners are pleased or content with their online learning experiences and outcomes. It can be influenced by the perceived usefulness, enjoyment, and quality of using computers and digital technologies for online learning purposes. Computer self-efficacy can affect online learners' satisfaction by affecting their perceived value and benefit of using computers and digital technologies for online learning purposes. For example, online learners may be more satisfied if they have high computer self-efficacy that makes them perceive computers and digital technologies as useful, enjoyable, and high-quality tools for enhancing their online learning experiences and outcomes, or if they receive positive feedback and recognition from instructors, peers, or systems that acknowledge their achievements and progress when using computers and digital technologies for online learning purposes.
- Performance refers to the degree to which online learners achieve their desired learning goals and outcomes when using computers and digital technologies for online learning purposes. It can be influenced by the perceived ease of use, efficiency, and effectiveness of using computers and digital technologies for online learning purposes. Computer self-efficacy can affect online learners' performance by affecting their perceived ability and opportunity to use computers and digital technologies for online learning purposes. For example, online learners may perform better if they have high computer self-efficacy that makes them able and willing to use computers and digital technologies for online learning purposes, or if they have sufficient resources, time, and conditions to use computers and digital technologies for online learning purposes (Wong & Liem, 2021; Kuo et al., 2021; Sun et al., 2022).

Motivational Beliefs

The beliefs about one's own ability, goal orientation, self-efficacy, intrinsic motivation, and value for online learning can affect online learners' engagement by influencing their effort, persistence, and achievement in online learning tasks (Al Mamun & Lawrie, 2021; Fabian et al., 2022; Wong & Liem, 2021).

- Effort refers to the degree to which online learners exert physical and mental energy to complete the online learning tasks. It can be influenced by the perceived difficulty, challenge, and feedback of the online learning tasks. Motivational beliefs can affect online learners' effort by affecting their perceived competence and confidence in completing the online learning tasks. For example, online learners may exert more effort if they have high ability beliefs that make them believe that they have the skills and knowledge to complete the online learning tasks successfully, or if they have high self-efficacy beliefs that make them believe that they can overcome any obstacles or difficulties that they may encounter in completing the online learning tasks.
- Persistence refers to the degree to which online learners continue to engage in and complete the online learning tasks despite any challenges or distractions. It can be influenced

by the perceived interest, enjoyment, and relevance of the online learning tasks. Motivational beliefs can affect online learners' persistence by affecting their perceived intrinsic motivation and value for completing the online learning tasks. For example, online learners may persist more if they have high intrinsic motivation that makes them enjoy and find meaning in completing the online learning tasks for their own sake, or if they have high value beliefs that make them appreciate and recognize the benefits and outcomes of completing the online learning tasks for their future goals.

- Achievement refers to the degree to which online learners attain their desired learning goals and outcomes when completing the online learning tasks. It can be influenced by the perceived standards, criteria, and rewards of the online learning tasks. Motivational beliefs can affect online learners' achievement by affecting their perceived goal orientation and expectations for completing the online learning tasks. For example, online learners may achieve more if they have high mastery goal orientation that makes them focus on improving their own skills and knowledge when completing the online learning tasks, or if they have high expectations that make them anticipate positive feedback and recognition from instructors, peers, or systems when completing the online learning tasks (Ferrer, 2020; UCL, 2021; Yoo & Huang, 2013).

Learning Strategies

The strategies for planning, monitoring, and controlling one's own learning processes and outcomes in online learning environments can affect online learners' engagement by enhancing their self-regulation, metacognition, and feedback-seeking behaviors (Al Mamun & Lawrie, 2021; Weinstein et al., 2016; Wong & Liem, 2021). Learning strategies are the ways that students organize and use skills to learn content or accomplish tasks more effectively and efficiently. They involve actions and operations that students can choose and employ to optimize the processes of obtaining, storing, and using information. They also facilitate the active learning process by teaching students how to learn and how to solve problems and be successful. Learning strategies can include techniques for improved memory, studying, or test-taking. According to some studies, learning strategies can affect online learners' engagement by enhancing their self-regulation, metacognition, and feedback-seeking behaviors. Self-regulation refers to the ability of learners to monitor and control their own learning processes and outcomes. Metacognition refers to the awareness and understanding of one's own thinking and learning processes. Feedback-seeking behaviors refer to the actions that learners take to obtain information about their performance and progress from various sources.

Learning strategies can help online learners to set goals, plan their learning activities, manage their time and resources, evaluate their progress, seek help when needed, and reflect on their learning outcomes. These skills can help online learners to stay focused, motivated, confident, and resilient in online learning environments that may pose challenges such as isolation, distraction, lack of structure, or lack of support. Especially in higher education, where online

learners are expected to be more independent and self-directed, learning strategies can play a crucial role in fostering online learner engagement and success. Therefore, it is important for instructors to teach and model learning strategies for online learners and provide them with opportunities to practice and apply them in various contexts. Some examples of learning strategies that can be used in online learning are:

- Summarizing: Writing a brief summary of the main ideas or key points of a text or a lecture;
- Elaborating: Explaining or expanding on the material by using examples, analogies, or personal experiences;
- Rehearsing: Repeating or reviewing the material by using flashcards, mnemonics, or quizzes;
- Organizing: Arranging or grouping the material by using outlines, diagrams, charts, or maps;
- Self-questioning: Asking oneself questions about the material before, during, or after learning;
- Self-explaining: Explaining one's own reasoning or problem-solving process aloud or in writing;
- Self-testing: Testing oneself on the material by using practice tests or questions;
- Self-monitoring: Checking one's own understanding or performance by using feedback or self-assessment tools;
- Self-evaluating: Judging one's own learning outcomes by using criteria or standards; and
- Self-regulating: Adjusting one's own learning strategies or behaviors based on one's own goals and feedback (Al Mamun & Lawrie, 2021; Martin & Bolliger, 2022; UCL, 2021; Adobe eLearning, 2020; Weinstein et al., 2016).

As a result of integrating research from educational technology with research from educational psychology and the learning sciences, it is becoming recognized that the concept of online learner engagement must take into account both crucial aspects of learner engagement and the environmental affordances that influence them (Martin & Borup, 2022).

Educational Techniques for Enhancing Online Learner Engagement

There are many ways of naming and categorizing educational techniques. This paper prefers to use the term 'techniques' to affirm their practical nature, while other papers refer to 'tips' or 'strategies' with the same meaning. Working through the established dimensions of

learner engagement, several educational techniques that may be used to achieve each one is described below.

Social Engagement

Social engagement refers to the opportunities for students to interact with each other and the teaching team, and to feel a sense of belonging and connection to the learning community. Some strategies to foster social engagement are:

- Creating targeted discussion forums where students can share their opinions, experiences, and perspectives on the learning materials;
- Providing social forums and synchronous video conferences where students can introduce themselves, discuss their challenges, share their interests and hobbies, and get to know each other better;
- Encouraging students to use their names, photos, videos, or avatars to personalize their online presence and identity;
- Providing feedback and guidance to students regularly and promptly, and using a friendly and supportive tone; and
- Inviting guest speakers or experts to join the online sessions and share their insights or experiences with the students (Adobe eLearning, 2020; Khan et al., 2022; Kuo et al., 2022; Khan et al., 2017; Hrastinski & Dennen, 2019).

Cognitive Engagement

Cognitive engagement refers to the extent to which students are intellectually challenged and stimulated by the learning materials and activities, and how they apply their prior knowledge and skills to construct new understanding. Some strategies to enhance cognitive engagement are:

- Providing a variety of content formats such as text, audio, video, images, animations, or simulations to cater to different learning preferences and styles;
- Incorporating interactive elements such as quizzes, polls, games, or scenarios to test students' comprehension, recall or application of the content;
- Designing authentic and meaningful tasks or projects that require students to apply their knowledge and skills to real-world problems or situations;
- Providing scaffolding and support for students to gradually develop their cognitive abilities and self-regulation skills; and
- Encouraging students to reflect on their learning process and outcomes, and to seek feedback from peers or instructors (Adobe eLearning, 2020; Khan et al., 2022; Kuo et al., 2022; Khan et al., 2017).

Behavioural Engagement

Behavioural engagement refers to the extent to which students participate in the learning activities and demonstrate positive learning behaviours such as attendance, persistence, and effort. Some strategies to promote behavioural engagement are:

- Setting clear and realistic expectations for students' participation and performance, and communicating them frequently;
- Providing a flexible and accessible learning environment that allows students to access the content and activities at their own pace and convenience;
- Monitoring students' progress and attendance, and intervening early when signs of disengagement or difficulty are detected;
- Recognizing and rewarding students' achievements and efforts, such as by providing badges, certificates, points, or praise; and
- Encouraging students to set their own goals and track their own performance (Adobe eLearning, 2020; Khan et al., 2022; Kuo et al., 2022; Khan et al., 2017; Glantz et al., 2021).

Collaborative Engagement

Collaborative engagement refers to the extent to which students work together with others to co-create knowledge, share ideas, solve problems, or complete tasks. Some strategies to facilitate collaborative engagement are:

- Creating opportunities for students to work in small groups or teams on collaborative tasks or projects that require interdependence and coordination;
- Providing clear guidelines and expectations for group work, such as roles, responsibilities, timelines, and deliverables;
- Providing tools and platforms for students to communicate and collaborate online, such as chat rooms, wikis, blogs, or shared documents;
- Providing feedback and guidance to groups on their process and product, and encouraging peer feedback among group members; and
- Encouraging students to share their work or products with the whole class or a wider audience for review or critique (Adobe eLearning, 2020; Khan et al., 2022; Kuo et al., 2022; Khan et al., 2017).

Emotional Engagement

Emotional engagement refers to the extent to which students experience positive emotions such as interest, curiosity, enjoyment, or satisfaction during the learning process. Some strategies to foster emotional engagement are:

- Creating a safe and supportive learning environment that respects diversity, inclusivity, and equity;
- Providing emotional support and empathy to students who may face challenges or difficulties in online learning;
- Using humour, storytelling, or gamification elements to make the learning experience more fun and engaging;
- Relating the learning content or activities to students' personal interests, goals, or values; and
- Encouraging students to express their emotions or feelings about their learning experience through journals, surveys, or discussions (Adobe eLearning, 2020; Khan et al., 2022; Kuo et al., 2022; Khan et al., 2017; Hrastinski & Dennen, 2019; Glantz et al., 2021).

Gamification and Simulation Techniques for Enhancing Online Learner Engagement

Two hot topics of the 2020's include the use of gamification and simulations for educational purposes, especially in higher education. As such, they are not included in the general educational techniques outlined above, but are covered here in their own section.

Gamification

Gamification is the use of game-design elements such as points, badges, levels, leaderboards, rewards, challenges, or feedback in non-game contexts such as education, and aims to enhance students' motivation, engagement, learning outcomes and satisfaction by making the learning experience more fun, interactive, and meaningful. Some examples of gamification elements that can be used in online learning are:

- Points: numerical values that represent students' achievements or progress in the course;
- Badges: graphical icons that represent students' accomplishments or skills in the course;
- Levels: stages or milestones that indicate students' advancement or mastery in the course;
- Leaderboards: rankings that display students' relative positions or scores in the course;
- Rewards: incentives or prizes that students can earn or unlock by completing certain tasks or challenges in the course;
- Challenges: tasks or activities that require students to apply their knowledge or skills in a creative or competitive way; and
- Feedback: information or comments that provide students with guidance or recognition on their performance or progress in the course (Rivera & Garden, 2021; Welbers et al., 2019; Chans & Castro, 2021).

Well-designed gamification of educational activities can address some of the challenges and opportunities of online learning, such as:

- Increasing students' attention and interest in the learning content and activities;
- Providing students with immediate and frequent feedback on their progress and performance;
- Encouraging students to set their own goals and monitor their own learning;

- Fostering students' autonomy, competence, and relatedness, which are key psychological needs for intrinsic motivation;
- Promoting students' social interaction and collaboration with peers and instructors; and
- Supporting students' application of knowledge and skills to authentic and relevant problems or situations (Rivera & Garden, 2021; Welbers et al., 2019; Chans & Castro, 2021).

Gamification can be implemented in various ways depending on the learning objectives, context, and audience. Some general guidelines are:

- Align the gamification elements with the learning outcomes and assessment criteria;
- Choose the gamification elements that are appropriate for the content, level, and duration of the course;
- Balance the challenge and reward of the gamification elements to avoid frustration or boredom;
- Provide clear instructions and feedback on how to use the gamification elements and what they mean; and
- Allow students to opt-in or opt-out of the gamification elements if they prefer (Rivera & Garden, 2021; Welbers et al., 2019; Chans & Castro, 2021).

Simulations

Simulations are learning environments that mimic real-life situations or problems that require students to apply their knowledge and skills in a realistic and authentic context. A simulation usually consists of several rounds or stages that represent different scenarios or challenges that students must face and overcome. Simulations can be designed and delivered in different ways depending on the learning objectives, context, and audience, but a general process is as follows:

- **Setting the scene:** The instructor introduces the simulation topic, objectives, and rules to the students. The instructor also provides the students with the necessary background information, resources, and tools to prepare them for the simulation experience. The instructor may also assign the students to groups or roles if the simulation involves teamwork or role-playing.
- **Posing a first-round problem:** The instructor presents the students with the first scenario or challenge that they must solve or deal with in the simulation. The scenario or challenge should be relevant, realistic, and engaging for the students. The instructor may also

provide some hints, prompts or questions to guide the students' thinking and decision-making.

- Offering multiple possible solutions: The students explore and interact with the simulation environment and try to find possible solutions or actions to address the scenario or challenge. The students may also consult with their peers, instructors or other sources of information or feedback. The students should be able to choose from multiple possible solutions or actions that have different consequences or outcomes.
- Possibly scoring the solutions: The instructor may provide the students with immediate and frequent feedback on their solutions or actions in the form of scores, points, badges, rewards, or comments. The feedback should be informative, constructive, and motivational for the students. The feedback may also reflect the complexity and difficulty of the scenario or challenge and the quality and effectiveness of the solutions or actions.
- Going through to the second round of the simulation: The instructor presents the students with the next scenario or challenge that they must face in the simulation. The next scenario or challenge should be related to the previous one but more complex or difficult. The instructor may also provide some feedback or reflection on the previous scenario or challenge and how it affects the next one. The students repeat the same process as in the first round until they complete all the rounds or stages of the simulation (Wang & Chen, 2021; Chernikova et al., 2020; Vlachopoulos & Makri, 2017).

Simulations can be implemented in various ways depending on the learning objectives, context, and audience. Some general guidelines are:

- Align the simulation scenarios with the learning outcomes and assessment criteria;
- Choose the simulation technology that is appropriate for the content, level, and duration of the course;
- Balance the complexity and difficulty of the simulation scenarios to avoid frustration or boredom;
- Provide clear instructions and feedback on how to use the simulation technology and what it means; and
- Provide scaffolding and support for students to learn from the simulation experience, such as by providing hints, prompts, explanations, or reflections (Wang & Chen, 2021; Chernikova et al., 2020; Vlachopoulos & Makri, 2017).

Simulations can be implemented using various technologies such as virtual reality, augmented reality, computer-based games, or web-based platforms. Some examples of simulation technologies that can be used in online learning are:

- Virtual reality: a technology that creates a three-dimensional, computer-generated environment that users can explore and interact with using special devices such as headsets, gloves, or controllers;
- Augmented reality: a technology that overlays digital information or objects onto the real-world environment that users can see through devices such as smartphones, tablets, or glasses;
- Computer-based games: a technology that creates a two-dimensional or three-dimensional environment that users can play and interact with using devices such as computers, consoles, or mobile phones; and
- Web-based platforms: a technology that creates a web-based environment that users can access and interact with using devices such as computers, tablets, or mobile phones (Wang & Chen, 2021; Chernikova et al., 2020; Vlachopoulos & Makri, 2017).

Simulations can offer a wide range of benefits for online learning, such as:

- Providing students with opportunities to practice complex skills that are difficult or risky to perform in real life;
- Providing students with immediate and frequent feedback on their actions and decisions;
- Providing students with scaffolding and support to gradually develop their competence and confidence;
- Providing students with motivation, engagement, and enjoyment by creating immersive and interactive learning experiences; and
- Providing students with social interaction and collaboration with peers and instructors by creating shared or multiplayer scenarios (Wang & Chen, 2021; Chernikova et al., 2020; Vlachopoulos & Makri, 2017).

Finally, with specific reference to learner engagement, simulations can address some of the challenges and exploit some of the opportunities of online learning, such as:

- Increasing students' attention and interest in the learning content and activities by creating realistic and relevant scenarios;

- Enhancing students' cognitive engagement by challenging them to apply their knowledge and skills to solve problems or make decisions;
- Promoting students' behavioural engagement by providing them with opportunities to participate actively and demonstrate their performance;
- Facilitating students' collaborative engagement by providing them with opportunities to work together with others on shared goals or tasks; and
- Fostering students' emotional engagement by providing them with positive emotions such as curiosity, excitement, satisfaction, or pride (Wang & Chen, 2021; Chernikova et al., 2020; Vlachopoulos & Makri, 2017).

Methods and Instruments for Measuring Online Learner Engagement

The concept of learner engagement can be defined as the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught. It is a multidimensional construct that includes cognitive, behavioral, and emotional dimensions. In the context of online learning, learner engagement can be operationalized and measured in many ways (Ocelot, 2021), some of which are outlined below.

Measuring Methods

Self-reports

Self-report, such as using surveys, questionnaires, interviews, etc. to ask learners to report their own perceptions or experiences of engagement in online learning. Self-report surveys are one of the most commonly used methods for measuring online learning engagement. These surveys typically ask learners to rate their level of engagement with various aspects of the online learning environment, such as the course content, instructor feedback, and interaction with other learners. Self-report surveys can provide valuable information about learners' perceptions of their own engagement, but they are subject to response bias and may not accurately reflect learners' actual levels of engagement (Lee et al., 2019; Deng et al., 2020; Hickey, 2022; Bonner et al., 2022).

Behavioural logs

Behavioural logs, such as using logs, analytics, tracking systems, etc. to record learners' actions or behaviors in the online learning environment. Behavioral measures involve observing learners' behavior within the online learning environment. For example, researchers may track learners' participation in online discussions or their completion of course assignments. Behavioral measures can provide objective data about learners' engagement with the online learning environment, but they may not capture all aspects of learner engagement (Lee et al., 2019; Deng et al., 2020; Hickey, 2022; Bonner et al., 2022).

Physiological measures

Physiological measures, such as using sensors, devices, wearables, etc. to measure learners' physiological responses or reactions during or after online learning. Physiological measures involve monitoring learners' physiological responses to the online learning environment. For example, researchers may use electroencephalography (EEG) to measure learners' brain activity while they engage with online course materials. Physiological measures can provide valuable information about learners' cognitive and emotional responses to the online learning environment, but they are expensive and require specialized equipment and expertise (Lee et al., 2019; Deng et al., 2020; Altuwairqi et al., 2021; Hickey, 2022; Bonner et al., 2022).

Learning analytics

Learning analytics, such as using algorithms, models, dashboards, etc. to analyze learners' data or patterns in the online learning environment. These are methods that use data collected from online learning platforms or systems to measure learners' behavior, interaction, performance, etc. They can provide objective and quantitative indicators of engagement, such as time spent on the course, number of logins, number of posts or comments, completion rates, grades, etc. Some examples of learning analytics tools are Google Analytics, Moodle Analytics, and Blackboard Analytics (Lee et al., 2019; Hickey, 2022).

Observation and feedback

Observation and feedback are methods that involve observing learners' actions, expressions, emotions, etc. during online learning activities or sessions, and providing feedback to them or soliciting feedback from them. They can provide qualitative and contextual insights into learners' engagement, such as their attention level, interest level, mood, challenges, etc. Some examples of observation and feedback methods are video recordings, screen recordings, eye tracking, think-aloud protocols, interviews, focus groups, etc. (Ocelot, 2021; Farrell & Brunton, 2020).

In addition to the quantitative approach often used for larger scale studies, several qualitative studies into learner engagement are emerging that made use of methods such as case studies, student reports, work sample analysis, experience sampling, direct observation, and interviews. Case studies are a good way of getting intricate insights into specific student populations. Student reports are where students are tasked with writing about their own experiences. Work sample analysis involves analyzing student work samples to determine the level of engagement. Experience sampling is where students are asked to report on their experiences at random intervals throughout the day. Direct observation involves observing students in the classroom or online environment. Interviews involve interviewing students about their experiences with learning (Bolliger & Martin, 2022; Farrell & Brunton, 2020).

Measuring Instruments

In addition, there are also several instruments commonly used for measuring learner engagement in the context of higher education. In fact, there are so many that Buntins et al (2021) identify 246 of them, and, quite understandably, call for 'convergence'. A few of the better-known research instruments relevant to on online learner engagement in higher education include:

The National Survey of Student Engagement

The NSSE is a survey that measures the level of student participation in programs and activities that are related to learning and personal development at four-year colleges and universities in Canada and the United States. It operationalises the concept of online learner engagement by assessing students' engagement in ten indicators that reflect empirically confirmed good practices in undergraduate education, such as higher-order learning, reflective and integrative learning, collaborative learning, student-faculty interaction, effective teaching practices, quality of interactions, supportive environment, learning strategies, quantitative reasoning, and discussions with diverse others. It includes 47 items that are grouped into four themes: academic challenge, learning with peers, experiences with faculty and campus environment. It can be used for face-to-face, blended and fully online courses. It is suitable for undergraduate students at four-year colleges and universities (About NSSE, nd).

The Student Course Engagement Questionnaire

Through four different metrics—skills engagement, emotional engagement, participation/interaction engagement, and performance engagement—the SCEQ survey evaluates students' engagement in a given course. By measuring students' involvement in cognitive, emotive, and behavioral components of learning that are connected to academic success and satisfaction, it operationalizes the idea of online learner engagement. It includes 23 items that are rated on a five-point Likert scale ranging from 1 (never) to 5 (very often). It can be used for face-to-face, blended and fully online courses. It is suitable for undergraduate and graduate students at colleges and universities (Handelsman et al., 2005).

The Online Student Engagement Scale

The OSE survey measures students' engagement in online courses along three dimensions: skills engagement, emotional engagement, and participation/interaction engagement. By measuring students' involvement in cognitive, affective, and behavioral learning components that are connected to academic success and happiness in online courses, it operationalizes the idea of online learner engagement. It includes 19 items that are rated on a five-point Likert scale ranging from 1 (never) to 5 (very often). It can be used for fully online courses only. It is suitable for undergraduate and graduate students at colleges and universities (Dixon, 2015).

The Gamification for Student Engagement Scale

The GSES instrument investigates how students' perceptions of gamification elements impact their level of engagement with online learning. By measuring students' reactions to game-design components like points, badges, levels, leaderboards, awards, or challenges that are used to improve motivation, interactivity, and feedback in online learning, it operationalizes the idea of online learner engagement. It includes 20 items that are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It can be used for fully online or blended courses that incorporate gamification elements. It is suitable for undergraduate and graduate students at colleges and universities (Rivera & Garden, 2021).

The Online Learning Engagement Scale

The OLES survey gauges how engaged students are with online learning cognitively, emotionally, and behaviorally. It operationalizes the concept of online learner engagement by assessing students' involvement in intellectual challenge, interest stimulation, effort regulation and active participation in online learning. It includes 19 items that are rated on a five-point Likert scale ranging from 1 (never) to 5 (very often). It can be used for fully online or blended courses. It is suitable for undergraduate and graduate students at colleges and universities (Lutz et al., 2019).

The Online Learning Satisfaction Scale

Students' satisfaction with learner, instructor, course, program, and organization-related aspects of online learning is gauged by the OLSS. By evaluating students' judgments of value related to their educational experience in online learning, it operationalizes the idea of online learner satisfaction. It includes 17 items that are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It can be used for fully online or blended courses. It is suitable for undergraduate and graduate students at colleges and universities (Kuyo et al., 2013; Kuo et al., 2014; Bacila et al., 2014).

The Virtual In-Class Engagement Measure

The VIEM measures how successfully students engage in online workshops, webinars, and lectures. By measuring students' involvement in cognitive, affective, and behavioral components of learning that are connected to academic success and satisfaction in virtual contexts, it operationalizes the idea of online learner engagement. It includes 14 items that are grouped into two parts: observer assessment and learner self-assessment of engagement. The observer assessment consists of seven items that are rated on a four-point Likert scale ranging from 1 (never) to 4 (always) by a trained observer who monitors learners' behaviours during the virtual event, such as asking questions, using chat functions, turning on video or audio, or pretending to participate. The learner self-assessment consists of seven items that are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) by the learners themselves after the virtual event, such as feeling engaged, interested, motivated, attentive, distracted, bored, or confused. It can be used for fully online or blended courses that incorporate virtual educational events. It is suitable for surgical attendings,

fellows and residents at medical institutions (Dickinson, 2021; Dickinson et al., 2021; Dickinson et al., 2022).

The Australasian Survey of Student Engagement

The AUSSE instrument assesses how much student participation there is in learning- and personal-development-related programs and activities at higher education institutions in Australia and New Zealand. It operationalizes the concept of online learner engagement by assessing students' engagement in six indicators that reflect empirically confirmed good practices in undergraduate education, such as academic challenge, active learning, student and staff interactions, enriching educational experiences, supportive learning environment and work integrated learning. It includes 62 items that are grouped into two themes: student engagement and outcomes. It can be used for face-to-face, blended and fully online courses. It is suitable for undergraduate students at higher education institutions (Coates & Radloff, 2008; Hagel et al., 2012; Carr et al., 2015);

The Online Motivation and Engagement Scale

The OMES is a self-report measure that assesses university students' motivation and engagement in online learning environments. It is based on the Motivation and Engagement Wheel framework, which identifies four types of motivation (self-belief, value, learning focus, and anxiety) and four types of engagement (planning, task management, persistence, and self-sabotage) that are relevant for academic achievement and well-being. The OMES operationalises the concept of online learner engagement as a combination of adaptive and maladaptive motivational and behavioural factors that influence students' involvement, participation, and performance in online courses. It assumes that online learner engagement is not a static trait, but a dynamic process that can be influenced by personal, contextual, and instructional factors. The OMES consists of 32 items that are rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The OMES can be used for both blended and fully online courses at the university level. It is not suitable for school or other educational settings where online learning is not the main mode of delivery (Martin et al., 2014). The OMES-U/C was adapted into Chinese during the COVID-19 pandemic (Yin, 2023).

Conclusion and Recommendations

This paper has provided a comprehensive literature review and synthesis of multiple articles on online learner engagement in higher education. It has discussed the factors that influence online learner engagement, the educational techniques that can enhance it, the gamification and simulation techniques that can also enhance it, and the methods and instruments for measuring it. The paper has shown that online learner engagement is a complex and multidimensional construct that can be affected by various personal, contextual, and instructional factors. It has also shown that online learner engagement can be fostered by various pedagogical strategies that promote interaction, collaboration, feedback, autonomy, challenge, relevance, and enjoyment. Moreover, it has shown that online learner engagement

can be measured by various methods and instruments that capture different aspects of students' involvement, participation, and interest in their online courses.

The paper has implications for online education practice and research. For online educators, the paper provides a framework for designing and delivering engaging online courses that consider the factors that influence online learner engagement and the techniques that can enhance it. For online researchers, the paper provides a guide for conducting and evaluating research on online learner engagement that consider the methods and instruments that can measure it. The paper also identifies some gaps and limitations in the existing literature and suggests some directions for future research on online learner engagement in higher education. Some of these directions are:

- To conduct more qualitative and mixed-methods studies that can provide richer and deeper insights into online learner engagement experiences and processes;
- To conduct more longitudinal and comparative studies that can examine how online learner engagement changes over time and across different contexts and settings;
- To conduct more intervention and experimental studies that can test the causal effects of different educational techniques on online learner engagement and its outcomes;
- To develop and validate more reliable and valid instruments for measuring online learner engagement that are specific to online learning environments and contexts; and
- To explore the role of emerging technologies such as artificial intelligence, virtual reality, augmented reality, and adaptive learning systems on online learner engagement and its outcomes.

Online learner engagement is a vital aspect of online education quality and effectiveness. By reviewing and synthesizing the existing literature on this topic, this paper hopes to contribute to the advancement of knowledge and practice in this field.

References

- About NSSE. (n.d.). *Evidence-Based Improvement in Higher Education*. <https://nsse.indiana.edu/nsse/about-nsse/index.html>
- Adobe eLearning. (2020). *15 tips and strategies to engage remote learners through high-impact virtual training*. <https://elearning.adobe.com/2020/12/15-tips-and-strategies-to-engage-remote-learners-through-high-impact-virtual-training/>
- Al Mamun, M. A., & Lawrie, G. (2021). The impact of learning strategies on online learner engagement in higher education: A systematic review. *British Journal of Educational Technology*, 52(5), 1979–2000. <https://doi.org/10.1111/bjet.13221>
- Altuwairqi, K., Jarraya, S. K., Allinjawi, A., & Hammami, M. (2021). Student behavior analysis to measure engagement levels in online learning environments. *Signal, Image and Video Processing*, 15(7), 1387-1395.
- Bacila, M. F., Pop, M. C., Scridon, M. A., & Ciornea, R. (2014). Development of an instrument for measuring student satisfaction in business educational institutions. *Amfiteatru Economic Journal*, 16(37), 841-856.
- Bolliger, D. U., & Martin, F. (2022). Developing an online learner satisfaction framework in higher education through a systematic review of research. *International Journal of Educational Technology in Higher Education*, 19(1), 50. <https://doi.org/10.1186/s41239-022-00355-5>
- Bonner, E., Garvey, K., Miner, M., Godin, S., & Reinders, H. (2022). Measuring real-time learner engagement in the Japanese EFL classroom. *Innovation in Language Learning and Teaching*, 1-11.
- Buntins, K., Kerres, M., & Heinemann, A. (2021). A scoping review of research instruments for measuring student engagement: In need for convergence. *International Journal of Educational Research Open*, 2, 100099. <https://doi.org/10.1016/j.ijedro.2021.100099>
- Carr, R., Palmer, S., & Hagel, P. (2015). Active learning: The importance of developing a comprehensive measure. *Active Learning in Higher Education*, 16(3), 173–186. <https://doi.org/10.1177/1469787415589529>
- Chans, G. M., & Castro, M. P. (2021). Gamification as a Strategy to Increase Motivation and Engagement in Higher Education Chemistry Students. *Computers*, 10(10), 132. <https://doi.org/10.3390/computers10100132>
- Chernikova, O., Heitzmann, N., Stadler, M., Holzberger, D., Seidel, T., & Fischer, F. (2020). Simulation-Based Learning in Higher Education: A Meta-Analysis. *Review of Educational Research*, 90(4), 499–541. <https://doi.org/10.3102/0034654320933544>
- Coates, H., & Radloff, A. (2008). *AUSSE 2008 development and methodology*. Australian Council for Educational Research.

https://web.archive.org/web/20091010131234/http://www.acer.edu.au/documents/AUSSE_2008DevelopmentAndMethodology.pdf

- Deng, R., Benckendorff, P., & Gannaway, D. (2020). Learner engagement in MOOCs: Scale development and validation. *British Journal of Educational Technology*, 51(1), 245-262.
- Dickinson, K. J. (2021). Assessing learner engagement with virtual educational events: Development of the Virtual In-Class Engagement Measure (VIEM). *The American Journal of Surgery*, 222(6): 1044-1049. MEDLINE. <https://search.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/en/covidwho-1439836>
- Dickinson, K. J., Caldwell, K. E., Graviss, E. A., Nguyen, D. T., Awad, M. M., & Tan, S. (2021). Assessing learner engagement with virtual educational events: Development of the Virtual In-Class Engagement Measure (VIEM). *The American Journal of Surgery*, 222(6), 1044-1049.
- Dickinson, K., Caldwell, K., Graviss, E. A., Nguyen, D. T., Awad, M., Olasky, J., Tan, S., Winer, J., & Pei, K. (2022). Perceptions and behaviors of learner engagement with virtual educational platforms. *The American Journal of Surgery*, 224(1), 371–374. <https://doi.org/10.1016/j.amjsurg.2022.02.043>
- Dixson, M. D. (2015). Measuring student engagement in the online course: The Online Student Engagement scale (OSE). *Online Learning*, 19(4), n4.
- Dumford, A. D., & Miller, A. L. (2018). Online learning in higher education: Exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education*, 30(3), 452–465. <https://doi.org/10.1007/s12528-018-9179-z>
- Fabian, K., Smith, S. E., Taylor-Smith, E., & Meharg, D. (2022). Identifying factors influencing study skills engagement and participation for online learners in higher education during COVID-19. *British Journal of Educational Technology*, 53(6), 1915–1936. <https://doi.org/10.1111/bjet.13221>
- Farrell, O., & Brunton, J. (2020). A balancing act: a window into online student engagement experiences. *International Journal of Educational Technology in Higher Education*, 17(1), 25. <https://doi.org/10.1186/s41239-020-00199-x>
- Ferrer, J., Ringer, A., Saville, K., Parris, M. A., & Kashi, K. (2020). Students' motivation and engagement in higher education: The importance of attitude to online learning. *Higher Education*, 83(2), 317–338. <https://doi.org/10.1007/s10734-020-00657-5>
- Glantz, E., Gamrat, C., Lenze, L., & Bardzell, J. (2021). Improved student engagement in higher education's next normal. *EDUCAUSE Review*. <https://er.educause.edu/articles/2021/3/improved-student-engagement-in-higher-educations-next-normal>

- Hagel, P., Carr, R., & Devlin, M. (2012). Conceptualising and measuring student engagement through the Australasian Survey of Student Engagement (AUSSE): A critique. *Assessment & Evaluation in Higher Education*, 37(4), 475-486.
- Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. *The Journal of Educational Research*, 98(3), 184–191. <https://doi.org/10.3200/JOER.98.3.184-192>
- Hickey, D. T. (2022). Situative approaches to online engagement, assessment, and equity. *Educational Psychologist*, 57(3), 221-225.
- Hrastinski, S., Cleveland-Innes, M., & Stenbom, S. (2018). Tutoring online learners in higher education: A model for identifying and developing roles and competencies of online tutors. *TechTrends*, 62(4), 383–391. <https://doi.org/10.1007/s12528-018-9179-z>
- Kahn, P. H., Everington, L., Kelm, K., Reid, I. M., & Watkins, F. (2017). Understanding student engagement in online learning environments: The role of reflexivity. *Educational Technology Research and Development*, 65(1), 203–218. <https://doi.org/10.1007/s11423-016-9484-z>
- Kara, M. (2021). Revisiting online learner engagement: Exploring the role of learner characteristics in an emergency period. *Journal of Research on Technology in Education*, 54(sup1), S236–S252. <https://doi.org/10.1080/15391523.2021.1891997>
- Kuo, Y.-C., Walker, A. E., Belland, B. R., & Schroder, K. E. E. (2013). A predictive study of student satisfaction in online education programs. *The International Review of Research in Open and Distributed Learning*, 14(1), 16–39. <https://doi.org/10.19173/irrodl.v14i1.1338>
- Kuo, Y.-C., Walker, A. E., Schroder, K. E. E., & Belland, B. R. (2014). Interaction, Internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *The Internet and Higher Education*, 20, 35–50. <https://doi.org/10.1016/j.iheduc.2013.10.001>
- Kuo, T. M., Tsai, C.-C., & Wang, J.-C. (2021). Linking web-based learning self-efficacy and learning engagement in MOOCs: The role of online academic hardiness. *The Internet and Higher Education*, 51, Article 100819. <https://doi.org/10.1016/j.iheduc.2021.100819>
- Lazareva, A. (2017). Factors affecting student engagement in online collaborative learning courses. In *Advances in Intelligent Systems and Computing* (pp. 349–359). Springer Nature. https://doi.org/10.1007/978-3-319-73204-6_39
- Lee, J., Song, H. D., & Hong, A. J. (2019). Exploring factors, and indicators for measuring students' sustainable engagement in e-learning. *Sustainability*, 11(4), 985.

- Lutz, B., Bergman, S., & Pitterson, N. (2019). Measuring student course engagement: A validation study. *Computers & Education*, 142, 103635. <https://doi.org/10.1016/j.compedu.2019.103635>
- Martin, A. J., Papworth, B., Ginns, P., & Liem, G. A. D. (2014). The Online Motivation and Engagement Scale for university students: A psychometric validation. *Computers & Education*, 76, 399-413. <https://doi.org/10.1016/j.compedu.2014.04.002>
- Martin, F., & Bolliger, D. U. (2022). Developing an online learner satisfaction framework in higher education through a systematic review of research. *International Journal of Educational Technology in Higher Education*, 19(1). <https://doi.org/10.1186/s41239-022-00355-5>
- Martin, F., & Borup, J. (2022). Online learner engagement: Conceptual definitions, research themes, and supportive practices. *Educational Psychologist*, 57(3), 162-177.
- Martin, F., Xie, K., & Bolliger, D. U. (2022). Engaging learners in the emergency transition to online learning during the COVID-19 pandemic. *Journal of Research on Technology in Education*, 54(sup1), S1–S13. <https://doi.org/10.1080/15391523.2021.1991703>
- McKinsey. (2020, October 29). *How technology is shaping learning in higher education*. <https://www.mckinsey.com/industries/education/our-insights/how-technology-is-shaping-learning-in-higher-education>
- Ocelot, O. (2021). Measuring Student Engagement in Higher Education. *Ocelot*. <https://www.ocelotbot.com/blog/measuring-student-engagement-in-higher-education/>
- Paulsen, J., & McCormick, A. C. (2020). Reassessing disparities in online learner student engagement in higher education. *Educational Researcher*, 49(1), 20-29.
- Rivera, E. S., & Garden, C. L. (2021). Gamification for student engagement: a framework. *Journal of Further and Higher Education*, 45(7), 999–1012. <https://doi.org/10.1080/0309877x.2021.1875201>
- Sun, W., Hong, J., Dong, Y., Huang, Y., & Fu, Q. (2022). Self-directed learning predicts online learning engagement in higher education mediated by perceived value of knowing learning goals. *Asia-Pacific Education Researcher*, 32(3), 307–316. <https://doi.org/10.1007/s40299-022-00653-6>
- Tualualelei, E., Burke, K., Fanshawe, M., & Cameron, C. (2022). Mapping pedagogical touchpoints: Exploring online student engagement and course design. *Active Learning in Higher Education*, 23(3), 189-203.
- UCL. (2021). Encouraging student engagement with blended and online learning. *University College London Teaching & Learning Portal*. <https://www.ucl.ac.uk/teaching-learning/publications/2021/oct/encouraging-student-engagement-blended-and-online-learning>

- Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(1). <https://doi.org/10.1186/s41239-017-0062-1>
- Wang, Y., & Chen, N.-S. (2021). The impact of simulation-based learning on student engagement: A systematic review. *Computers & Education*, 164, 104166. <https://doi.org/10.1016/j.compedu.2021.104166>
- Weinstein, Y., Madan, C. R., & Sumeracki, M. A. (2016). Learning strategies: A synthesis and conceptual model. *Science of Learning*, 1(1), Article 16013. <https://doi.org/10.1038/npjscilearn.2016.13>
- Welbers, K., Konijn, E. A., Burgers, C., De Vaate, A. J. D. B., Eden, A., & Brugman, B. C. (2019). Gamification as a tool for engaging student learning: A field experiment with a gamified app. *E-learning and Digital Media*, 16(2), 92–109. <https://doi.org/10.1177/2042753018818342>
- Wong, B., & Liem, G.A.D. (2021). Self-regulated learning in online learning environments: Strategies for remote learning during COVID-19 school closures and beyond. *British Journal of Educational Technology*, 52(5), 2001–2018. <https://doi.org/10.1111/bjet.13099>
- Yin, H. (2023). A mixed blessing: student engagement in emergency online learning during COVID-19 in China. *Assessment & Evaluation in Higher Education*, 48(3), 362-376.
- Yoo, S. K., & Huang, W. (2013). Engaging online adult learners in higher education: Motivational factors impacted by gender, age, and prior experiences. *The Journal of Continuing Higher Education*, 61(3), 151–164. <https://doi.org/10.1080/07377363.2013.836823>

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Conflict of Interest

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