

The Impact of Social Network Engagement-Based Design Features on the Effectiveness of e-Learning Platforms

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Abstract

Billions of people use one or more social networking applications, such as Instagram, TikTok, and Facebook, on a daily basis. The amount of time that people of all ages spend on these platforms has reached unprecedented levels. Social networking applications have fundamentally transformed the ways in which people communicate, collaborate, work, and socialize, exerting an unprecedented influence on everyday life. User engagement is widely regarded as a major indicator of social network platforms' success because it enhances user retention, supports growth, and provides insights. The concept of user engagement is therefore central to understanding the rapid growth and widespread popularity of social networking applications. Several factors may explain engagement behavior. One potentially important factor is the specific architectural design features implemented by software engineers to attract, and retain users, and to encourage prolonged use. In this paper, we draw on the DeLone and McLean (1992) Information Systems Success Model to develop genuine research propositions. We aim to examine how social networks design features associated with intensive user engagement may influence users' behavior in the educational environment. We argue that incorporating selected engagement-oriented design features into online learning systems, when implemented appropriately and ethically, may increase learner engagement and potentially improve learning effectiveness. We also argue that the higher the user's IT self-efficacy the more engaged they would be.

Keywords: E-learning effectiveness, user engagement, pervasive design, social networks

Introduction

Social networking applications have fundamentally transformed the way in which people communicate, collaborate, work, and socialize. Billions of individuals use one or more of these applications on a daily basis, and many users spend substantial amounts of time interacting with them. Several factors may contribute to such behaviors, including the design characteristics embedded within digital applications. Researchers have increasingly examined how certain app-design features can capture users' attention, encourage repeated interactions, and reinforce continued use. Examples include notifications, personalization, feedback mechanisms, social rewards, infinite scrolling, recommendations, and other forms of interaction designed to sustain users' attention and engagement.

This observation made us turn our focus to the very popular area of student learning, particularly online student learning where the topic of student engagement has dominated research work in the education discipline. In fact, Technology-integrated learning has become vital in online educational environment. Instructors teaching in virtual classrooms continuously seek innovative strategies to improve teaching and learning experiences and to facilitate meaningful interactions that enhance student engagement (West & Jones, 2007).

Interest in online student engagement has increased significantly because engagement is widely recognized as an important factor contributing to students' learning, academic success, and overall educational outcomes (Carini, Kuh, & Klein, 2006; Kuh et al., 2007; Glanville & Wildhagen, 2007). We therefore argue in this paper that selected engagement-oriented design features used in highly engaging digital applications if adapted ethically and appropriately to educational platforms may promote sustained student engagement and learning? Carefully selected engagement-oriented design techniques may contribute to the development of online educational platforms capable of sustaining students' engagement intensively. This study also considers the role of IT self-efficacy as a potentially important factor influencing students' interactions with online educational platforms. The following section provides a more detailed discussion about the concept of engagement in online educational environments, engagement-oriented app-design features, and IT self-efficacy.

The conceptual framework

Social Network Platforms and Engagement-Based Architecture Design

Smith (2026) argues that social media has evolved from a relatively novel communication technology into an increasingly pervasive component of everyday life, transforming how individuals communicate, interact, and consume information. This transformation has also been accompanied by the development of business models in which user attention and engagement constitute important economic resources. Many major social media platforms generate substantial revenue through advertising. Their ability to provide personalized advertising depends, in part, on the collection and analysis of large amounts of user data. Information about users' activities, preferences, interactions, and interests can be analyzed to personalize the content and advertisements presented to them. "The extraordinary growth of applications such as WhatsApp, Facebook, Instagram, and TikTok is partly due to the proven impact of their design features on user engagement" (Smith (2026). Platforms incorporate numerous features that can influence how users allocate their attention including personalized recommendations, notifications, infinite scrolling, likes, comments, social feedback, and continuously updated content. These features can function as forms of **attentional scaffolding**, shaping users' attention and influencing what they see, when they interact, and how long they remain on a platform.

According to Smith (2026), some of these design approaches draw on psychological principles that have also been used in gambling and online gaming. Examining the relationship between these design features and users' psychological responses can therefore provide insight into the mechanisms through which social media platforms encourage sustained engagement. Notifications represent a particularly important example. Push notifications can prompt users to return to an application and check for new information or social feedback. When the timing or content of a reward is uncertain, the anticipation of receiving a rewarding outcome may encourage repeated checking. Some applications have incorporated features that make repeated or daily engagement an explicit component of the user experience. These features illustrate how social rewards and continuity mechanisms can be incorporated directly into platform design to encourage recurring participation. Hartford et al. (2022) situate these practices within the broader literature on persuasive design. Persuasive design refers to the development of technologies intended to influence users' attitudes or behaviors. Importantly, persuasive design does not necessarily imply manipulation or harm. This study is particularly interested in examining the intensive engagement behaviors associated with social networking applications and exploring whether insights from these environments can contribute to our understanding of student engagement, particularly in the virtual world.

The concept of student engagement

The definition of student engagement has increasingly been refined as higher education institutions examine how to enhance students' levels of engagement on campus. As Lester (2013) noted, "the definition of engagement is being redefined in more specific ways as institutions examine multiple aspects of engagement in pursuit of increased levels on campus." Similarly, Fredricks, Blumenfeld, and Paris (2004) conceptualized student engagement as a multidimensional construct encompassing behavioral, emotional, and cognitive dimensions. Wang (2025) conducted an extensive review on the concept of student engagement. The review concluded that "student engagement can be understood in terms of the extent to which students acquire and apply knowledge, respond to feedback provided by instructors, invest in effort and energy in learning tasks, and establish meaningful connections with those tasks". Bergdahl et al. (2024) emphasized the importance of student engagement for understanding how teaching and learning can be improved. A substantial body of previous research has also identified associations between student engagement and several important educational and developmental outcomes, including student well-being, retention, academic achievement, and future career outcomes (Bergdahl et al., 2020; Bond et al., 2020; Fredricks et al., 2004; Henrie et al., 2018). Other studies have reported relationships between student engagement and academic grades and satisfaction (Webber et al., 2013), as well as critical-thinking outcomes (Nelson Laird et al., 2014).

Online Student Engagement

Prakasha et al. (2023) argue that the COVID-19 pandemic accelerated the adoption of online platforms by educational institutions, making online learning an increasingly important component of education across different settings, including students' homes and workplaces. As a result, online student engagement has received considerable scholarly attention, particularly regarding its impact on learning effectiveness. Student engagement may differ substantially between online and face-to-face instructional environments, and several factors can influence engagement in online settings (Dwivedi et al., 2019). In face-to-face environments, instructors can employ a variety of strategies to engage students, including asking questions, facilitating discussions, observing nonverbal communication, and responding to students' emotional and behavioral cues. In online environments, however, these strategies can be more difficult to implement because instructors have limited opportunities to observe students' body Research on online student engagement remains relatively underdeveloped, and further investigation is needed to strengthen theoretical understanding of the mechanisms through which engagement can be created

and sustained in virtual learning environments which we aim to accomplish in this paper. The engagement mechanisms found in social networking applications are particularly relevant to the study of online student engagement because these platforms have developed sophisticated features designed to capture and maintain users' attention. Accordingly, this study is particularly interested in examining the intensive engagement behaviors associated with social networking applications and exploring whether insights from these environments can contribute to our understanding of engagement in online learning. The second variable used in this study is IT self-efficacy.

Technology Self Efficacy

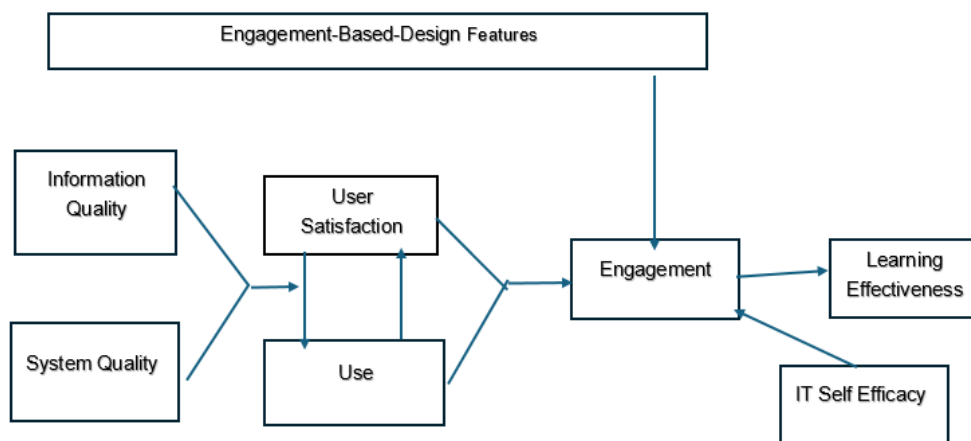
Bandura (1977, 1986) defines self-efficacy as an individual's judgment of "how well one can execute courses of action required to deal with prospective situations". In other words, self-efficacy refers to an individual's belief in his or her capability to successfully perform a particular task or achieve a desired outcome. Self-efficacy construct has been particularly influential in Information Technology research through the development of **IT Self-efficacy (ITSE)**. ITSE represents a domain-specific form of self-efficacy concerned with an individual's perceived capability to use computers and perform computer-related tasks. Compeau and Higgins (1995) adapted Bandura's self-efficacy framework to the computing domain and conceptualized computer self-efficacy as an individual's judgment of his or her capability to use a computer. ITSE therefore reflects individuals' perceptions of their ability to perform computer-related activities rather than their objective level of computer knowledge or technical skill (Compeau & Higgins, 1995; Simmering et al., 2009).

IT self-efficacy can be particularly important when individuals encounter unfamiliar technologies or challenging computer-related tasks. When individuals believe that they possess the capability to successfully perform a technology-related task, they are more likely to approach the task, invest effort, and persist when difficulties occur. It is this persistence characteristic that make us believe may impact student engagement. Conversely, individuals who doubt their technological capabilities may avoid challenging tasks, experience greater anxiety or uncertainty, and disengage when difficulties arise. Previous research has associated higher levels of computer self-efficacy with more positive perceptions and experiences concerning technology. Individuals with higher ITSE have been found to be more likely to perceive computer-related tasks as manageable, persist when encountering difficulties, and develop favorable perceptions of information technologies (Agarwal et al., 2000; Compeau & Higgins, 1995; Igbaria, 1995; Venkatesh, 2000; Venkatesh & Davis, 1996; Wixom & Todd, 2005).

These differences in ITSE are particularly relevant to online educational platforms. Students with high computer self-efficacy may be more willing to experiment with unfamiliar technologies, complete technology-related assignments, seek solutions when difficulties arise, and persist until a task is completed. Students with lower CSE, in contrast, may perceive similar tasks as exceeding their capabilities and may consequently experience greater uncertainty, frustration, or anxiety. Thus, CSE may influence not only students' behavioral responses to technology but also their emotional and psychological responses during technology use.

The following research framework summarizes our research propositions.

The research framework



We use DeLone and McLean (1992) IT Success Model to provides the theoretical foundation for this study. Originally developed to evaluate the success of information systems within organizational contexts, the model has been widely adopted and applied across various IT environments, including e-learning systems. The model conceptualizes IT success as a multidimensional construct comprising six dimensions: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. One of the key strengths of the model is its comprehensive approach to evaluating information systems. Rather than focusing exclusively on the technical characteristics of a system, the model incorporates both system-related factors and their consequences for users and organizations. Consequently, it provides a holistic framework for understanding how the quality and use of an information system contribute to individual and organizational outcomes.

The model has been extensively used in IS research to assess the success of various types of information systems, including enterprise systems, healthcare information systems, e-commerce platforms, and e-

learning systems. Previous research has demonstrated its usefulness in identifying the factors that contribute to IT success and in explaining how system characteristics influence users' experiences and outcomes. Although the model provides an established foundation for assessing IT success, the specific characteristics of e-learning environments require additional consideration. In this study, the model is used to examine the factors that influence engagement and learning effectiveness in e-learning systems. Specifically, the proposed model introduces engagement-based design features, IT self-efficacy, user engagement, and learning effectiveness as key constructs. In the proposed framework, user engagement replaces the original "individual impact" construct, reflecting the central role of students' active and sustained interaction with e-learning systems. Learning effectiveness replaces the "organizational impact" construct, as the primary outcome of an e-learning system is the extent to which learners effectively acquire, understand, and apply the knowledge and skills presented through the system. In addition, engagement-based design features and IT self-efficacy are added as new explanatory variables. The proposed model is based on the assumption that the design characteristics of an e-learning system can influence students' engagement with the system.

We argue that when e-learning systems incorporate engagement-based design features commonly observed in social networking applications, these features may encourage users to interact with the system more frequently and for longer periods. Such features may include mechanisms designed to stimulate repeated use, continuous interaction, personalized content consumption, feedback, rewards, and other forms of persistent user engagement. We further propose that IT self-efficacy influences user engagement. Students who have greater confidence in their ability to use information technologies are expected to experience fewer difficulties when interacting with an e-learning system. This confidence may facilitate more frequent and sustained interaction with the system, thereby increasing their level of engagement. Finally, we propose that user engagement positively influences learning effectiveness. When learners are highly engaged with an e-learning system, they are more likely to devote time and cognitive effort to learning activities, interact with learning materials, explore additional content, and persist in the learning process. Sustained engagement can therefore provide learners with greater opportunities to process, practice, and consolidate knowledge. As a result, increased engagement is expected to contribute to improved learning effectiveness.

Conclusion

This paper proposes a new perspective on understanding and improving student engagement in online educational environments by

examining the potential educational applications of engagement-based design features commonly used in social networking platforms. This study argues that selected engagement-oriented mechanisms, when appropriately adapted and ethically implemented, may contribute positively to online learning experiences. The central argument is that design features capable of sustaining users' attention and encouraging repeated interaction in social networking applications may also be used to foster meaningful and sustained engagement with educational content.

Drawing on the DeLone and McLean Information Systems Success Model, this paper develops an adapted theoretical framework that incorporates engagement-based design features, IT self-efficacy, user engagement, and learning effectiveness. The proposed framework suggests that carefully selected design mechanisms, including personalized content, notifications, feedback, rewards, and interactive features, may positively influence students' engagement with online educational platforms. Furthermore, the framework proposes that IT self-efficacy plays an important role in explaining differences in student engagement. Students who are more confident in their ability to use information technologies are expected to demonstrate greater willingness to interact with online learning systems, overcome technological challenges, and persist in learning activities. In turn, higher levels of student engagement are expected to contribute to greater learning effectiveness by encouraging sustained attention, active participation, and deeper interaction with educational materials.

The study offers several potential contributions to the literature. First, it extends the application of the DeLone and McLean IS Success Model to contemporary online learning environments by incorporating design-related and individual behavioral factors. Second, it introduces engagement-based design features as a potentially important antecedent of student engagement, thereby establishing a theoretical connection between research on social networking applications and online education. Third, it highlights the importance of IT self-efficacy in understanding students' engagement with educational technologies. Together, these contributions provide a conceptual foundation for examining how technological design and individual user characteristics may jointly influence learning effectiveness.

From a practical perspective, the proposed framework has implications for educational institutions, instructors, and developers of online learning platforms. It suggests that greater attention should be devoted not only to the quality and accessibility of educational content but also to the design characteristics that motivate students to return to learning platforms and remain actively involved in learning activities. However, an important distinction must be maintained between promoting productive educational

engagement and encouraging compulsive technology use. Finally, because this paper presents a theoretical framework rather than empirical findings, future research is needed to examine and validate the proposed relationships. Empirical studies could investigate the relative influence of specific engagement-based design features on student engagement, assess the effects of IT self-efficacy, and determine whether increased engagement translates into measurable improvements in learning effectiveness. Future research should also examine the ethical boundaries and potential unintended consequences of incorporating such features into educational technologies.

Conflict of Interest: The author reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

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