Online Learning Issues, Challenges, and Trends in Higher Education: An Instructional Design Perspective Beyond Pandemic

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Previous literature indicates that online learning has three issues and challenges - technological, pedagogical, and affective. Those issues and challenges are reflected in the following aspects: learning engagement, learning diversity, learning resources, learning assessment/feedback and learning environment. Among these, learning engagement is the most historical and central issue for online learning. This paper will share the vision for online learning trends beyond the Pandemic in Higher Education from an instructional design perspective by reviewing its potential issues and challenges. However, this study is more focused on discussing pedagogical and affective issues and challenges and how technological advancement potentially transforms students' learning experience pedagogically and effectively.

Introduction

Due to the impacts of the pandemic, there is an increasing demand for online learning. Meanwhile, there are challenges and concerns for online learning, including pedagogical, technological, and affective (Ferri et al., 2020; Yeung & Yau, 2022). This paper aims to reflect on the challenges above and issues with online learning faced during and beyond the pandemic. It delves into five critical aspects from instructional design perspectives:

1) learning engagement, 2) learning diversity, 3) learning resources, 4) learning assessment/feedback, and 5) learning environment. Additionally, this paper discusses the potential technology-driven solutions and trends in addressing online learning concerns, primarily focusing on emerging technologies such as extended reality (XR), simulation, artificial intelligence (AI), and learning analytics.

Issues and challenges

Learning engagement: Social connection

The online learning engagement issue is historically rooted in the absence or limitation of social connection (Ragusa & Crampton, 2018). The physical distance between learners and instructors separates individual learners from each other geologically and emotionally. During the pandemic, an increasing number of students enrolled in online learning, but the portion of students who were engaged with online learning decreased over time (Spitzer et al., 2021). To achieve a similar learning engagement and social connection as learners and instructors expected for formal face-to-face instruction, efforts should also be made in various aspects, such as learning environment, learning resources, learning assessment, and learning community/diversity.

Learning diversity: Tolerance of diversity

Online learners' cultural and linguistic backgrounds contribute to their online learning challenges, and hence a one-size-fits-all approach no longer serves the success of online learning. (Kerr et al., 2018). Although the call for designing for diversity within online learning has been discussed previously, the need for tolerance of diversity expects online learning to effectively engage each learner and provide a learning environment where learners can seamlessly switch between a universal learning environment and a personalized one. This "paradoxical" expectation is challenging the current online learning mode.

Learning resources: Interactive and engaging

Multimedia learning resources are pedagogically equivalent in helping learners acquire theoretical knowledge and even more effective in practical skills (Syed et al., 2019). To enhance students' learning effect and expand online learning into different learning domains, there is a need for teaching materials in the form of interactive multimedia, including images, animations,gamification, simulation, or even immersive or conversational learning resources (Ferri et al., 2020; Thomas & Rogers, 2020).

Learning assessment and feedback: In-time and intelligent

In online education, there is frustration about the lack of immediacy in responses and the feedback latency and quality concerns (Yeung & Yau, 2022), while instructors reported time commitment and workload issues.

Especially during the pandemic, well-being concerns with faculty arose as faculty reported burnout (Ardito et al., 2022). Besides, there is limited viability for measuring different types of learning; those learning goals of affective and psychomotor domains are difficult to reckon with the current mainstream online learning system (e.g.,

synchronous virtual meeting and LMS). The conflict between students' expectations and instructors' limits suggests adapting assessments to the new learning requirements and calls for a new solutionthat provides students with in-time and personalized responses or feedback (Rapanta et al., 2020).

Learning environment: Engaging and powerful

Previous studies have indicated that the home environment, while comfortable, maybe non-conducive to online learning (Ferri et al., 2020; Yeung & Yau, 2022). Students often struggle with noise, distractions, and small spaces while studying at home (Bringula et al., 2021). They also had difficulty maintaining attention in purely online contexts, reporting boredom, isolation, time management challenges, and a lack of self-organizing capabilities (Carolan et al., 2020). In response to those issues, it calls for an engaging and powerful learning environment (Thomas & Rogers, 2020).

Technologies-driven solutions

Addressing the challenges above will require massive work, energy, and time from different online learning stakeholders. It is unrealistic to address either of them without the support of technological advancement at a large scale because of practical challenges in real life, including funding limits, personal life commitments and other responsibilities, time constraints, and mental health concerns. Therefore, we will discuss how technological advancement could address the concerns on social and affective dimensions of online learning.

Extended reality

XR is an umbrella term encapsulating Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), and everything in between (Milgram & Kishino, 1994). Incorporating XR-based learning in online learning will primarily address concerns related to learning engagement, complex learning, assessment of learning in psychomotor and affective domains, and promoting learning diversity. For example, 1) Learning resources:

XR-based learning resources can be visual, immersive, and interactive (Donkor, 2010). AR technology can overlay the objects over reality, MR or VR students in a virtual world that simulates reality. 2) Learning assessment: XR-based learning, especially VR, can expand online learning to domains such as affective and psychomotor rather than just focusing on cognitive domains. 3) Learning environment: XR-based learning could provide an experiential, engaging, personalizable, and interactive learning environment. 4) Learning Community: Students can virtually meet and build a social connection; as it is experiential learning, the learning itself could be customized by students to match their needs, in which case the diversity of students could be accommodated and embraced.

Simulation

Simulation is a concept related to the delivery format. Some low-cost simulation products could be easily created and applied in online learning. Simulation is an alternative option to XR-based learning resources that can contribute to engaging and interactive learning experiences. Compared to XR-based learning resources, it is more cost-effective.

Artificial intelligence

AI-enabled online learning features, such as automatic feedback, could alleviate students' concerns about the lack of response immediacy and learning feedback latency (Georgia Tech, 2020). Emerging AI technologies could improve online learning for personalized and adaptive learning experiences (Peng, Ma, & Spector, 2019). AI-enabled learning management systems could identify students' learning gaps, provide personalized learning paths, and recommend learning content (Tapalova & Zhiyenbayeva, 2022; Raj & Renumol, 2022); this will

benefit students of diverse backgrounds with different learning needs, create a learning community that embraces the difference and diversity. Generative AI can customize learning resources and generate unique materials and assessments for different subjects/courses (van den Berg & du Plessis, 2023; Saunders, 2023), helping instructors cope with time constraint concerns and expanding the online learning assessment limit.

Learning analytics

Using learning analytics in online learning will monitor and regulate online students' learning behaviors, increase learners' interaction and learning engagement, predict online students' learning performance, personalize learners' learning experiences and feedback, increase learners' retention rates, and help improve future online learning courses (Kew & Tasir, 2022; Ramaswami et al., 2023). A learning analytics dashboard is a typical application in online learning whereby instructors can visualize learning data and provide actional feedback (Susnjak, Ramaswami, & Mathrani, 2022). The learning analytics dashboard often functions as a centralized hub through which you can identify at-risk students, help with real-time learning progress tracking, develop data-informed teaching strategies, and provide personalized learning experiences.

Conclusions and discussion

These technologies-driven solutions above will redefine the online learning future. It might be a new form of blended learning in which AI-enabled online learning combines with VR-supported virtual learning, offering self-paced, adaptive, personalized learning experiences. Learning resources will become more interactive through simulation and XR technologies. Students could receive personalized assessments and instant feedback with the support of learning analytics and AI technologies. These learning tools will better prepare future generations for unexpected crises.

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